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ABSTRACT

In spring 1996, Arizona's Glendale Community College (GCC) undertook an evaluation of an introductory macroeconomics course using the national Test of Understanding in College Economics (TUCE III). Specifically, the study sought to determine how GCC student outcomes compared to national results on the TUCE III and if the college's macroeconomics course made a statistical difference on student scores between the pre-course and post-course tests. The TUCE III pre-test was administered to students in three sections of the macroeconomic course during the first week of class, while the post-test was administered as a final exam. Study results, based on outcomes for 63 students who took both the pre- and post-tests, included the following: (1) the mean pre-test score for GCC students was 8.96, very close to the national norm of 9.18; (2) the mean score on the post-test for GCC students was 13.57, indicating that the course did make a significant difference in student TUCE III scores; (3) GCC students' mean post-test score was also not significantly different from the national mean of 14.31; and (4) although the TUCE III was found to provide valuable data, it was recommended that it not be used on a regular basis at GCC due to issues related to grading, the underrepresentation of community colleges in the national sample, and other issues. The test instrument, national pre- and post-test results, tables of score comparisons, and an examiners manual are appended. (TGI)

USING THE TEST OF UNDERSTANDING IN COLLEGE ECONOMICS (TUCE III) TO EVALUATE GCC'S MACROECONOMICS COURSE: AN ANALYSIS AND SUBSEQUENT ASSESSMENT

JUNE, 1997

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DATE: June 30, 1997

TO: Dean Alberto Sanchez

FROM: Michael C. Petrowsky

RE: Evaluation of the Macroeconomics Principles Course (ECN 111) using the national Test of Understanding in College Economics (TUCE III)

Enclosed is a report that evaluates three macroeconomics principles classes using the national Test of Understanding in College Economics (TUCE III). The classes were given a standardized, national, norm referenced exam at the beginning and end of the Spring 1996 semester. These pre(course) test and post(course) test results were then analyzed using a variety of statistical techniques that included classical hypothesis testing, ANOVA, Chi Square analysis, and related nonparametric methods.

The results indicate that completion of the macroeconomics course significantly raised TUCE III scores for GCC students. The continued use of the TUCE III as an ongoing evaluative instrument, however, remains problematic because of implementation difficulties.

I am indebted to you and to Paul DePippo for support in preparing this document. But any errors and omissions are clearly the fault of yours truly.

Michael C. Petrowsky

EXECUTIVE SUMMARY

Three classes in macroeconomics principles (ECN 111) were evaluated using the national **Test of Understanding in College Economics** (TUCE III). For each of these classes, the TUCE III test was given at the beginning of the semester (first week) and the end of the semester as a final exam. A comparison of the precourse test results with the postcourse test results indicate that completion of the macroeconomics course had significantly raised (in a statistical sense) the TUCE III scores for GCC students. Further, a breakdown of the TUCE III into content and cognitive components also showed that GCC students benefited in both areas as a result of course completion.

Despite these positive results, however, the TUCE III should not be used on an ongoing, routine basis. The costs of using the instrument may outweigh its benefits when seen from a community college perspective. The TUCE III could still be used on a nonroutine basis, though, to supplement other evaluative instruments.

CONTENTS

USING THE TEST OF UNDERSTANDING IN COLLEGE ECONOMICS (TUCE III) TO EVALUATE GCC'S MACROECONOMICS COURSE: AN ANALYSIS AND SUBSEQUENT ASSESSMENT

I. RATIONALE FOR STUDY

In 1991, the Joint Council on Economic Education (JCEE) published its third edition of the **Test of Understanding in College Economics** (TUCE III). Included with the test were norm referenced results that were based on the test being given to 2,724 students who took an introductory macroeconomics course in 53 colleges and universities.

The test, along with its norm referenced results, was designed to aid in measuring course evaluation of the introductory macroeconomics course at the college level. The measuring instrument could thus be used as a precourse and postcourse test. But it could also be used to compare a particular course at a given college with national norms.

The 30 question TUCE III is shown in Appendix A. The results of the nationwide test are in Appendix B. Pre and posttest scores are shown for the 2,724 students who answered the first 30 questions on both the precourse test and the postcourse test. Also shown in Appendix B are mean scores in terms of number correct, percentile ranks, and T – scores as related to the raw score (number correct) in each category.

Given this wealth of information, a number of questions can be usefully raised vis-à-vis the students who take macroeconomics at Glendale Community College (GCC). These concerns focus on the following:

1. Can the TUCE III be a measuring tool in GCC's evaluation efforts?
2. How do the students at GCC measure up to national standards in both the precourse and postcourse tests?
3. Can a GCC macroeconomics course make a statistical difference between

precourse and postcourse test scores?

These issues determined the focus of the study.

II. SCOPE OF SURVEY

During the Spring of 1996, the TUCE III was administered to three introductory macroeconomics classes (ECN 111). The 30 question version of the TUCE III was given inasmuch as it excluded questions on international trade and finance. The precourse test was given during the first week of class. Students were given approximately 50 minutes to complete the exam. The postcourse test was used in lieu of a final exam.

For the three classes, the number of students surveyed included the following:

- 84 students had taken the precourse test.
- 66 students had taken the postcourse test.
- 63 students had taken both the pre and posttest

The fluctuating numbers here do pose a problem, but it is not insurmountable. The normal drops and adds during the first week of the semester are one factor. So, too, is the usual attrition that occurs during the semester. In any event, data for the 63 students that had taken both the pre and posttest will be used for purposes of this study, for this most closely conforms to the national data illustrated in Appendix B.

This pre and post data provide the raw information that is used in the survey. Because of this, several cautionary notes are in order. First, the survey is not random in

the statistical sense of the word. Problems are obviously generated in terms of wider interpretive validity.

Second, there may be a problem with the pretest data. While the posttest was treated as a final exam, the pretest carried no grade significance. There is thus the very real possibility that students may not have treated the pretest with the same intensity as the posttest. The nature and extent of this effect is not known. Yet it should be pointed out that this problem would have affected the national norms as well.

Finally, there is the limitation associated with sample size. As previously noted, 84 students from three macroeconomics classes had taken the pretest, while only 63 students had taken both the precourse and postcourse test. This fluctuating size precludes making generalizations with strong assurance.

III. SURVEY RESULTS

A. AGGREGATE PRECOURSE & POSTCOURSE SCORES ON THE TUCE III IN MACROECONOMICS

Appendix C contains the raw data for the 63 students who had taken both the precourse test and the postcourse test. This data is summarized in Table 1 (below) which contrasts the GCC pre and posttest scores with national performance. (The scores are "raw" in the sense that they show the number of correct responses.)

TABLE 1

COMPARISON OF PRECOURSE AND POSTCOURSE MEAN SCORES*
ON THE TUCE III (MACROECONOMICS) FOR GCC STUDENTS
AND NATIONAL SURVEY

	PRETEST MEAN SCORE	POSTTEST MEAN SCORE	DIFFERENCE	N
GCC	8.96	13.57	4.61	63
NATION	9.18	14.31	5.13	2724

*Scores indicate number of correct responses.

As can be seen from the data, the precourse test score for GCC students was 8.96, which was very close to the national norm of 9.18 This small difference was found to be statistically insignificant at the .05 level. What this means, in effect, is that the GCC students start with essentially the same economic understanding as those who participated in the national study. This is surprising, for it should be remembered that for the 53 schools that participated, only five were two year colleges. The rest consisted of doctorate granting institutions, comprehensive universities and colleges, and four year colleges.

Table 1 also contrasts the GCC precourse and postcourse mean test scores. While the GCC students had a mean score of 8.96 on the precourse test, the postcourse mean test score was 13.57 for a difference of 4.61 points. This difference was shown to be statistically significant at the .05 level as evidenced by the following statistical tests:

1. The difference between the GCC precourse and postcourse test means was subjected to classical hypothesis testing. The results are shown in Appendix D. The null hypothesis (that there was no difference) was rejected at the .05 level.
2. ANOVA was also used to test the difference between the GCC pretest and posttest means. The null hypothesis of no difference was rejected at the .05 alpha level. (Appendix E.)
3. The statistical significance between GCC pretest and posttest scores was also supported by Chi Square analysis (Appendix F).
4. Appendix G shows the results of the Wilcoxon Rank-Sum (nonparametric) and Signed Rank tests of the data. Again, the null hypothesis of no difference was rejected at the alpha .05 level.

From the above, it does appear that the macroeconomics course did make a statistically significant difference in raising TUCE III mean scores. While the GCC mean posttest score is low (13.57 or 45.2 % correct), it is not different, in a statistically significant sense, from the national posttest mean of 14.31. The low scores, moreover, should be interpreted in the context that the TUCE III was designed as a norm referenced instrument with percentile ranks.

B. PRECOURSE & POSTCOURSE SCORES BY CONTENT AND COGNITIVE CATEGORIES (MACROECONOMICS)

1. Analysis of Pre & Post Cognitive Categories in Macroeconomics

The previous section compared aggregate pretest and posttest data. The TUCE III, however, breaks the 30 questions down by content and cognitive categories. This breakdown is shown in Appendix H, which is a page taken from the TUCE III Examiner's Manual. Similarly, an explanation of the content and cognitive specifications are shown in Appendix I. On a somewhat simple level, the major difference between these two specifications is that while the content specifications emphasize general understanding in six topics, the cognitive specifications stress the ability to both explicitly and implicitly apply economic principles.

Appendix J shows the precourse and postcourse performance, by cognitive classification of questions, on the TUCE III in the national study. Once again, this has been taken from the TUCE III Examiner's Manual. Portions of this data (it also includes data for the microeconomics course) have then been used to compare and contrast the national performance with GCC students. The results for the macroeconomics course are shown in Table 2, where the cognitive categories (Recognition & Understanding, Explicit Application, and Implicit Application), are highlighted against pre and posttest columns for the GCC students and the national study. The numbers show the mean % correct in each cognitive specification.

TABLE 2

MEAN % CORRECT RESPONSES, BY COGNITIVE CATEGORY:
PRE & POSTTEST PERFORMANCE IN MACROECONOMICS FOR GCC STUDENTS AND NATIONAL STUDY

COGNITIVE CATEGORY	PRETEST		POSTTEST		QUESTIONS IN EACH
	National	GCC	National	GCC	
RU Recognition & Understanding	.317	.295	.534	.525	10
EA Explicit Application	.356	.345	.494	.442	10
IA Implicit Application	.244	.233	.403	.365	10
N	2724	84	2724	66	
MEAN	9.18	8.73	14.31	13.33	

Some qualifications regarding this data are in order. First, computational and data manipulation problems prevented classical hypothesis testing for each category. Number crunching was simply too onerous. Second, the pretest n values for the GCC students include all those who completed the TUCE III in macroeconomics, while the n values in the posttest include all those who had completed the posttest but not necessarily the pretest. The GCC data, then, are not exactly comparable to the GCC data used in the previous aggregate pre and post data section. This data is shown in Appendix K. Given these qualifications, the data in Table 2 were subjected to nonparametric (Wilcoxon Rank Sum) tests. The results indicated the following:

a. Appendix L compares the national precourse test cognitive data with that for

GCC students. There was found to be no significant difference at the .05 alpha level.

b. Appendix M compares the GCC precourse test cognitive data with the GCC posttest cognitive data. The null hypothesis (that there was no difference) was rejected at the .05 level.

c. The national postcourse test cognitive data was compared to the GCC postcourse test cognitive data. No significant difference was found at the .05 alpha level. (Appendix N).

While the results here are preliminary and perhaps sketchy, there is some evidence to show that cognitive (critical thinking) skills are improved for GCC students when seen from the vantage point of pre and postcourse test data and national norms. The completion of a course in macroeconomics did raise the number of correct responses in the three cognitive areas of recognition and understanding, explicit application, and implicit application.

2. Analysis of Pre & Post Content Categories in Macroeconomics

As was indicated previously, Appendices H and I provide background material that explains the content specifications along with the five content areas. Unfortunately, the material provided in Appendix J for the national pre and posttest performance by cognitive classification was not available in the Examiner's Manual for the content

categories. Because of this, a comparison between GCC students and national norms could not be made. However, it was possible to compare the performance of GCC students in the content area using precourse and postcourse test data.

Table 3 (below) shows pre and postcourse test data for GCC students by the five content categories. These content areas are highlighted against pre and posttest columns for the GCC students. The numbers show the mean% correct in each content category.

TABLE 3

MEAN % CORRECT RESPONSES BY CONTENT CATEGORY:
PRE & POSTTEST SCORES IN MACROECONOMICS FOR GCC STUDENTS

CONTENT CATEGORY	PRETEST	POSTTEST	QUESTIONS
A. Measuring Agg. Economic Performance	.361	.530	3
B. Aggregate Supply, Economic Growth	.354	.469	4
C. Income & Expenditure Approach to Aggregate Demand & Fiscal Policy	.302	.378	8
D. Monetary Approach to Aggregate Demand And Monetary Policy	.264	.474	9
E. Policy Combinations	.246	.426	6
F. International Economics	. USED IN MICROECONOMICS		
SAMPLE SIZE	84	66	

Appendix O compares the mean pre and post course content scores using the Wilcoxon Rank Sum (nonparametric) test. Results indicate that the null hypothesis

(that there was no difference) was rejected at the .05 alpha level, thus generating support for the hypothesis that the ECN 111 course in macroeconomics did improve performance in the five content areas. Similar results were obtained when another nonparametric test (Wilcoxon Signed Rank) was used. These results are shown in Appendix P.

Although individual content categories were not tested, it should be pointed out that the posttest scores were higher than the pretest scores in all content categories. The greatest gain appeared in the monetary economics area (79%), while the least gain showed up in the fiscal policy category (25%). From all this, it seems apparent that significant improvement did occur for GCC students in general economic understanding that involved macroeconomic concepts.

IV. USING THE TUCE III IN MACRO: SOME CONSIDERATIONS

There are numerous advantages to using the TUCE III as an evaluative instrument in the macroeconomics principles course. First, it does provide a wealth of information, and especially so in its breakdown of the test into cognitive and content categories. Second, norms have been developed on the national level that are most useful for assessing an individual school's performance. Needless to say, this adds an extra dimension to any evaluative effort.

But the use of the TUCE III has other, practical advantages as well. It has been developed as a standardized, generic test, with the consequent result that it is textbook

neutral. With over 20 macroeconomics textbooks on the market, and with each of them having slight nuances in terms of coverage, jargon, political slant, etc., this is no small advantage, and makes faculty consensus on the choice of a testing instrument that much easier.

Finally, the TUCE III has a certain amount of built in flexibility which is also desirable. As an example, the three international trade questions have been conveniently placed at the end of both the microeconomics and macroeconomics versions of the test. Because the economics profession is rather split over where to teach international trade (with some favoring microeconomics over macroeconomics and vice versa), this gives the instructor a much needed flexibility, a flexibility which is made even easier by the development of a comprehensive Examiner's Manual which accompanies the test package.

Despite these advantages, however, the TUCE III does have its weaknesses when used at community colleges. First, and as was mentioned in Section III, community colleges were clearly underrepresented in the national study, with only five community colleges being surveyed out of a total of 53 colleges and universities. What effect this has on norms is not known, but it cannot be helpful for community colleges.

Second, there is an emphasis in the TUCE III on application and policy questions that are both content and cognitive based. This may pose a problem for those instructors that eschew policy and applications because of value driven connotations. For these

instructors, the under emphasis given to pure theory and related mechanics may prove discomforting if not troublesome. And especially so in the macro policy area.

Third, there may be some problems involved in grading. Although the TUCE III does have the virtue of converting raw scores into percentile ranks, this may still be unsettling for those instructors that use other grading systems. Clearly, the use of the TUCE III might pose difficult – and perhaps insurmountable raw score/grade conversion problems - for many teachers not accustomed to norm referenced tests. Thus, a very real implementation quandary could be encountered if TUCE III was hastily used.

Fourth, there may be an unintended consequence in terms of student retention, student satisfaction, and the like. Because the TUCE III is very much textbook neutral, its use can be quite scary to the fledgling community college student who still heavily relies on the textbook and classroom notes.(I saw instances of this when I used the TUCE III as a final exam. Several students were visibly shaken and flustered.) For these students – and we do have many at our community colleges – any departure from classroom material is likely to produce high stress and anxiety. Although the effect of this on student retention is not known, it hardly seems positive.

Finally, there is a practical downside to using the TUCE III as a final exam evaluative instrument. If it is properly administered, it is designed as a 30 to 33 question test that should take less than an hour to complete. Yet our final exam time slots are normally two hours. In addition, many instructors may find that the test is simply not comprehensive enough. For these teachers, more questions would be needed.

For all these reasons, it is probably not feasible to use the TUCE III on an ongoing routine basis at community colleges. The quantitative, information generating virtues of the test are in all likelihood outweighed by the dysfunctional side effects previously noted. While this cost – benefit analysis has to be done at all colleges and universities, it appears likely that, at least for community colleges, the discomfort of using TUCE III may outweigh its advantages.

V. ANALYSIS OF FINDINGS & RECOMMENDATIONS

A. FINDINGS

1. The GCC student mean post course scores were significantly higher than the mean precourse test scores when tested by classical hypothesis testing, ANOVA, Chi Square analysis, and nonparametric methods. The macroeconomics principles course (ECN 111) did make a difference, then, in raising the TUCE III scores to a level statistically insignificant from posttest national standards.
2. When evaluated from TUCE III's cognitive and content categories, GCC students also showed statistically significant improvement as a result of taking a macroeconomics course. Critical thinking skills, as well as general macroeconomics understanding, did improve after course completion.

3. The use of TUCE III as an evaluative instrument was problematic at best. The cost of using the instrument may outweigh its benefits.

B. RECOMMENDATIONS

1. The TUCE III should probably not be used on an on going, routine basis. Rather, other evaluative instruments should be used that are more sensitive to the needs of community colleges.
2. The TUCE III can be used on a nonroutine basis to supplement other evaluative instruments. The national norms that were developed from the TUCE III give it a singular strength that is not easily dismissed.

NOTES

For a complete discussion of all background issues concerning the TUCE III, see Phillip Saunders, **Test of Understanding in College Economics: Examiner's Manual**. Joint Council on Economic Education, 1991. Third Edition.

TEST OF UNDERSTANDING IN COLLEGE ECONOMICS

MACROECONOMICS

THIS TEST IS AN IMPORTANT PART OF A NATIONAL EFFORT TO IMPROVE THE TEACHING OF INTRODUCTORY ECONOMICS.

YOUR INSTRUCTOR WILL INFORM YOU:

A. IF YOU SHOULD ANSWER ALL 33 QUESTIONS, OR IF YOU SHOULD ANSWER ONLY THE FIRST 30 QUESTIONS AND SKIP THE LAST 3;

B. IF YOUR SCORE ON THIS TEST WILL COUNT AS PART OF YOUR COURSE GRADE.

PLEASE DO YOUR **VERY BEST** TO CORRECTLY ANSWER ALL THE QUESTIONS ASSIGNED BY YOUR INSTRUCTOR.

1. **USE A PENCIL** to put your **NAME** and **SOCIAL SECURITY OR STUDENT I.D. NUMBER** on the **SEPARATE ANSWER SHEET. BLACKEN** in the appropriate circles under the letters of your name and **BLACKEN** in the appropriate circles under the numbers of your Social Security or student I.D. number.

2. For all questions assigned by your instructor, use the **SEPARATE ANSWER SHEET,** and select the **ONE BEST** answer for each question. Use **HEAVY** black marks that fill the circle completely to record your answer on the **SEPARATE ANSWER SHEET.**

EXAMPLES	IMPORTANT DIRECTIONS FOR MARKING ANSWERS
WRONG 1 ① ⊠ ③ ④ ⑤	• Use #2 pencil only.
WRONG 2 ① ② ✓ ④ ⑤	• Do NOT use ink or ball point pen.
WRONG 3 ① ② ③ ● ⑤	• Make heavy black marks that fill the circle completely.
	• Erase cleanly any answer you wish to change.
	• Make no stray marks on the answer sheet.
RIGHT 4 ① ② ③ ● ⑤	

3. Turn in **BOTH** the question sheets and the separate answer sheet after you have answered all the questions assigned by your instructor.

First edition 1967. Second edition 1980. Third edition 1991.

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1. Which of the following is counted as "investment" in national income accounting?

   A. Building a new factory.
   B. Buying an existing house.
   C. Purchasing corporate stocks and bonds.
   D. Depositing money in a commercial bank.

2. Assume that between 1982 and 1992 GNP in a certain economy increases from $1 trillion to $2 trillion, while the GNP price index increases from 100 to 200.

   How much is GNP in 1992, stated in terms of 1982 dollars?

   A. $1/2 trillion
   B. $1 trillion
   C. $2 trillion
   D. $4 trillion

3. An increase in the overall price level that is accompanied by a short-run increase in unemployment is most likely to be caused by:

   A. a decrease in aggregate demand.
   B. an increase in aggregate demand.
   C. a decrease in aggregate supply.
   D. an increase in aggregate supply.

4. "On the whole, statistics show that the velocity of money is high when the interest rate is high." Which of the following best explains this relationship?

   A. Banks "ration" credit.
   B. Rapid growth in GNP occurs when velocity is high.
   C. Velocity goes up when the supply of money goes up.
   D. The interest rate is a measure of the cost of holding money balances.

5. If people's expectations about price level changes enter into their economic decisions, which of the following monetary policies would be most likely to promote price stability?

   A. A stable and unannounced long-term growth rate in the money supply.
   B. Frequent and unannounced changes in the growth rate of the money supply.
   C. A stable and publicly announced long-term growth rate in the money supply.
   D. Frequent and publicly announced changes in the growth rate of the money supply.

6. The meaning of the quotation, "Every government has a fiscal policy, whether it realizes it or not," is best expressed by which of the following statements?

   A. Every government is forced to do something about recessions and inflation, whether it wants to or not.
   B. In many cases, decisions to spend money must be made even though the expenditure runs contrary to the policy indicated.
   C. Every government must decide on a tax and expenditure program, and this will influence the economy and the components of GNP.
   D. Every government must make decisions about the quantity of money in the economy, and this will influence credit conditions and the rate of interest.

7. The limit of an economy's total productive capacity at any given time is set by:
   A. the amount of money in circulation.
   B. business demand for goods and services.
   C. the level of government spending and taxation.
   D. the quantity and quality of its productive resources.

8. In comparing an increase in government spending on goods and services to an increase in private investment spending, we can correctly say that in the short run:
   A. they will both shift aggregate supply.
   B. they will both shift aggregate demand.
   C. government spending is inflationary; private investment is not.
   D. government spending must equal taxes; private investment must equal saving.

9. Using the equation GNP = C + I + G + (Exports – Imports), if the U.S. economy is at full employment, with widespread inflation, an increase in its exports and a decrease in its imports would tend to:
   A. make the U.S. inflation worse.
   B. reduce the demand for dollars on the part of foreigners.
   C. contract the U.S. economy, since we would end up losing gold.
   D. reduce inflation in the U.S., but increase inflation in other countries.

10. According to Keynesian theory, how will increasing government spending on goods and services when unemployment is 10 percent have a different effect from a similar increase when unemployment is 5 percent?
   A. At 10 percent unemployment, government spending is more likely to increase prices than real output.
   B. At 5 percent unemployment, government spending is more likely to increase real output than prices.
   C. At 10 percent unemployment, it is more likely that government spending would require a sacrifice of private goods.
   D. At 5 percent unemployment, it is more likely that government spending would require a sacrifice of private goods.

11. According to the monetarists:
   A. changes in the money supply are the primary cause of changes in the price level.
   B. the supply of money changes in response to changes in the levels of real output and prices.
   C. changes in the velocity of money are more important than changes in the money supply in causing the level of economic activity to change.
   D. an expansionary fiscal policy will lower interest rates and thereby tend to overstimulate investment and consumption unless the money supply is reduced.

12. "If the value of output in an industry increases by 4 percent per year, and workers receive a wage increase of 4 percent per year, then nothing is left to increase the compensation of other factors of production."

    Which one of the following best describes this quotation?
   A. It is essentially correct.
   B. It is incorrect because it confuses income with output.
   C. It is incorrect because wages are less than 100 percent of total factor payments.
   D. It is incorrect because the increase in wages actually reduces the real income of all other factors of production.

13. An expansionary monetary and contractionary fiscal policy mix would increase future economic growth if it promoted:

A. low interest rates, which encourage business investment.
B. high interest rates, which encourage people to save and invest.
C. low levels of personal savings to finance present consumption.
D. high levels of personal savings to finance future consumption.

14. Which of the following monetary policies would be most effective in combating inflation?

A. Reduce the discount rate.
B. Sell government securities on the open market.
C. Lower margin requirements on security purchases.
D. Reduce the reserve requirements of commercial banks.

15. Fiscal policy adviser Jones wants to increase aggregate demand while monetary policy adviser Smith wants to reduce aggregate demand. Which of the following combinations of fiscal and monetary policies would these two advisers suggest to achieve their conflicting goals?

A. tax decreases; open market sales of bonds by the Federal Reserve
B. tax decreases; open market purchases of bonds by the Federal Reserve
C. government spending decreases; an increase in the reserve requirements for commercial banks
D. equal decreases in taxes and government spending; an increase in the Federal Reserve's discount rate

16. Which of the following makes up the largest part of the "M1" money supply in the United States?

A. Treasury bonds
B. checking deposits
C. Federal Reserve notes
D. gold reserves of the federal government

17. A country is experiencing inflation, and the government is considering restricting aggregate private demand by either (1) increasing personal income tax rates, or (2) introducing a very tight monetary policy. If the government wishes to minimize the negative effect of its anti-inflationary policies on economic growth it should adopt:

A. the tight money policy because it restricts consumption expenditures more than investment.
B. the personal income tax increase because it restricts consumption expenditures more than investment.
C. the tight money policy because the tax increase would restrict investment more than it restricts consumption expenditures.
D. either the tight money policy or the personal income tax rate increase because both depress investment equally.

18. If aggregate demand declines relative to the productive capacity of the economy, which of the following is most likely to occur?

A. inflation
B. fewer exports
C. a slower growth rate
D. a federal budget surplus

19. Suppose that banks in the U.S. commercial banking system are holding $1 billion in excess reserves, but want to keep only $0.5 billion in excess reserves. If the required reserve ratio is 20 percent. and other things remain constant, what is the limit to demand deposit expansion in the system?

A. $0.5 billion
B. $2.0 billion
C. $2.5 billion
D. $5.0 billion

20. The central bank raised the discount rate it charged on loans to commercial banks. A critic who believed that market rates of interest should be kept low said that the central bank should instead have increased the legal reserve requirements of the commercial banks. Which of the following is true of the criticism?

A. It is self-contradictory.
B. It is based on correct economic analysis.
C. It confuses monetary policy with fiscal policy.
D. It confuses interest rates with the discount rate.

21. Which of the following would most likely result if the federal government increased its spending without increasing its tax revenues during a period of full employment?

A. a recession
B. higher inflation
C. lower interest rates
D. a smaller foreign trade deficit

22. "A $7.7 billion tax cut was accompanied by a $9 billion increase in consumer spending in the same year." The most probable reason why consumer spending increased by more than taxes were reduced is that:

A. the tax cut reduced interest rates which in turn stimulated consumer borrowing by others.
B. the tax cut induced more transfer payments which in turn caused consumer spending by others.
C. lower taxes required lower government spending which in turn encouraged private spending by others.
D. spending by those with higher take-home pay in turn generated additional production and spending by others.

23. "Unemployment last month was 4.8 percent of the work force, a slight reduction from the previous month. For the past fifteen months, unemployment has been under 5 percent of the work force. Consumer prices last month increased by two-tenths of a percent—a total gain of 2 percent over the level of one year ago. Total production of goods and services is projected to be 5 percent higher this year than it was last year."

Which of the following policies would be most appropriate for short-run stabilization objectives?

A. relying on automatic economic stabilizers
B. increasing both personal and corporate income taxes
C. passing new corporate tax incentives to encourage investment
D. increasing the minimum wage and expanding the number of jobs covered by these laws

24. "The gap between actual and potential output for this year is estimated to be 6 percent to 7 percent of potential output. Wholesale prices are virtually unchanged from one year ago. Unemployment is 8.8 percent of the civilian work force, the same level as three months ago."

Which of the following stabilization policies would be the most appropriate?

A. reductions in the federal debt
B. purchases of securities by the Federal Reserve
C. increases in corporate and personal income taxes
D. reductions in the length of time unemployed workers can receive unemployment benefits

25. "I have promised to do everything in my power to reduce the federal deficit. That means reducing federal expenditures and, if necessary, increasing taxes. Under present conditions of full employment and steady prices, we can afford to bear the burden of this debt now instead of passing it on to our children and grandchildren."

If the policies of the Senator quoted above were adopted, what effects would be expected *while these policies were being implemented*?

A. higher inflation
B. increased imports
C. higher rates of economic growth
D. increased unemployment and idle capacity

26. In today's "fractional reserve" banking system in the United States, the reserve requirements imposed on commercial banks are:

A. symbolic, because actual reserves greatly exceed the requirements.
B. averages of the amounts needed to meet the public's demand for money.
C. intended to set a limit on the total money supply rather than to serve as protection against bank runs.
D. in excess of what is normally needed, in case people become uneasy about the safety of their bank deposits.

27. Inflation will be more difficult for the monetary authorities to contain if most people expect a rapidly rising price level, because:

A. the velocity of circulation tends to fall when the public anticipates inflation.
B. sellers raise their prices with no regard for demand when their costs have risen.
C. expectations of rapid inflation reduce the opportunity cost of holding money.
D. expectations of rapid inflation reduce the public's willingness to hold money balances.

28. A large annual increase in the federal debt can lead to inflationary pressure if:

A. the total debt exceeds 50 percent of the nation's GNP.
B. business leaders are so concerned about the debt that they cut back investment expenditures.
C. the government attempts to liquidate the debt rapidly by increasing tax rates and cutting back government expenditures.
D. the debt leads the nation's central bank to maintain low interest rates when a more restrictive monetary policy is appropriate.

29. If rapid inflation occurs in a relatively full employment economy, well-coordinated monetary and fiscal policies would involve:

A. a government deficit, the sale of securities in the open market, and a higher discount rate.
B. a government surplus, the sale of securities in the open market, and a higher discount rate.
C. a government deficit, the purchase of securities in the open market, and a higher discount rate.
D. a government surplus, the purchase of securities in the open market, and a lower discount rate.

30. In a period of sluggish growth, there is a debate on whether to stimulate the economy by means of a tax cut or an increase in public expenditures. In the short run, a tax cut, as contrasted to an increase in government spending, is:

A. equally powerful on a per dollar basis, and favors private over public spending.
B. equally poweful on a per dollar basis, and is neutral between private and public spending.
C. not quite as powerful on a per dollar basis, and favors private over public spending.
D. not quite as powerful on a per dollar basis, and is neutral between private and public spending.

31. Two commonly used terms in international economics are "balance of trade" and "balance of payments." The relation between them is that:

A. one includes only goods and services, while the other includes all payments receipts.
B. one includes only goods and services, while the other includes only capital transactions.
C. the balance of payments can show a surplus or a deficit, but the balance of trade must always balance.
D. they are the same size, because one measures the "real" side, and the other the "monetary" side, of international transactions.

32. "To correct our balance of trade deficit, we should increase tariffs on imported goods." If tariffs are increased, the long-run effect is most likely to be:

A. a decrease in both U.S. imports and exports.
B. an increase in both U.S. imports and exports.
C. a decrease in U.S. imports, and an increase in U.S. exports.
D. an increase in U.S. imports, and a decrease in U.S. exports.

33. If the exchange rate between dollars ($) and yen (Y) changes from $1 = Y200 (Y1 = $.005) to $1 = Y100 (Y1 = $.01), and domestic prices in both countries stay the same, has the dollar appreciated or depreciated, and would U.S. imports from Japan become cheaper or more expensive?

	Value of the dollar	U.S. imports from Japan
A.	appreciated	cheaper
B.	appreciated	more expensive
C.	depreciated	cheaper
D.	depreciated	more expensive

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APPENDIX B

TABLE 6. Comparison of Pre- and Posttest Scores on Macro TUCE III for 2,724 Students Who Answered the First 30 Questions on Both the Pretest and the Posttest

	Pretest			Posttest		
Raw Score	No. of Scores	Per-centile Rank	T-Score	No. of Scores	Per-centile Rank	T-Score
30	0	—	—	2	99	80
29	0	—	—	7	99	78
28	0	—	—	16	99	76
27	0	—	—	17	98	74
26	0	—	—	37	97	72
25	2	99	102	33	96	70
24	1	99	99	53	94	68
23	1	99	95	54	92	67
22	4	99	92	79	90	65
21	3	99	89	84	87	63
20	4	99	85	100	84	61
19	6	99	82	116	80	59
18	9	99	79	137	75	57
17	17	98	76	123	70	55
16	38	97	72	177	65	53
15	57	95	69	165	58	51
14	92	93	66	175	52	49
13	132	88	63	201	45	47
12	181	83	59	195	38	46
11	234	75	56	227	30	44
10	326	65	53	205	22	42
9	396	52	49	182	15	40
8	403	37	46	150	9	38
7	322	24	43	91	5	36
6	258	13	40	51	2	34
5	128	6	36	32	1	32
4	81	2	33	12	1	30
3	21	1	30	2	1	28
2	7	1	26	1	1	27
1	1	1	23	0	—	—
Mean Score			9.18			14.31
Std. Deviation			3.05			5.24
K-R 20 Coefficient			.36			.77
Std. Error of Measurement			2.43			2.52

Source: Examiner's Manual, TUCE III.

CBS-Descriptive Statistics I-MACPR 07-07-1996 - 14:11:24

Information Entered

Data Form: Raw
Number of Data Points: 63

	macpr		macpr		macpr		macpr		macpr
1 =	7	14 =	13	27 =	10	40 =	10	53 =	11
2 =	8	15 =	9	28 =	10	41 =	9	54 =	7
3 =	7	16 =	12	29 =	7	42 =	12	55 =	9
4 =	10	17 =	9	30 =	2	43 =	10	56 =	5
5 =	10	18 =	6	31 =	12	44 =	13	57 =	7
6 =	8	19 =	4	32 =	14	45 =	13	58 =	7
7 =	5	20 =	7	33 =	9	46 =	6	59 =	6
8 =	8	21 =	4	34 =	9	47 =	9	60 =	6
9 =	11	22 =	12	35 =	7	48 =	10	61 =	12
10 =	10	23 =	12	36 =	7	49 =	11	62 =	12
11 =	7	24 =	7	37 =	7	50 =	7	63 =	3
12 =	11	25 =	12	38 =	19	51 =	7		
13 =	13	26 =	8	39 =	9	52 =	11		

Results

Mean:	8.9683
Median:	9
Mode:	7
Range:	17
Variance (S):	8.9022
Standard Deviation (S):	2.9837
Coefficient of Skewness:	0.3207
Coefficient of Kurtosis:	3.6976

CBS-Descriptive Statistics 63 GCC Students Who Took the Posttest -07-1996 - 14:19:03

Information Entered

Data Form: Raw
Number of Data Points: 63

	macpo		macpo		macpo		macpo		macpo
1 =	13	14 =	12	27 =	16	40 =	8	53 =	18
2 =	14	15 =	8	28 =	14	41 =	20	54 =	17
3 =	8	16 =	16	29 =	9	42 =	16	55 =	12
4 =	15	17 =	17	30 =	13	43 =	6	56 =	17
5 =	9	18 =	13	31 =	18	44 =	13	57 =	11
6 =	18	19 =	12	32 =	26	45 =	16	58 =	7
7 =	13	20 =	11	33 =	12	46 =	8	59 =	11
8 =	12	21 =	10	34 =	13	47 =	21	60 =	10
9 =	13	22 =	14	35 =	9	48 =	13	61 =	15
10 =	16	23 =	11	36 =	9	49 =	13	62 =	14
11 =	16	24 =	19	37 =	14	50 =	17	63 =	8
12 =	17	25 =	8	38 =	25	51 =	17		
13 =	14	26 =	12	39 =	16	52 =	12		

Results

Mean:	13.5714
Median:	13
Mode:	13
Range:	20
Variance (S):	16.6037
Standard Deviation (S):	4.0748
Coefficient of Skewness:	0.5939
Coefficient of Kurtosis:	3.5698

APPENDIX D

CBS-Hypothesis Testing

Hypothesis Testing of GCC Pre & Posttest Mean Scores in Macroeconomics

Information Entered

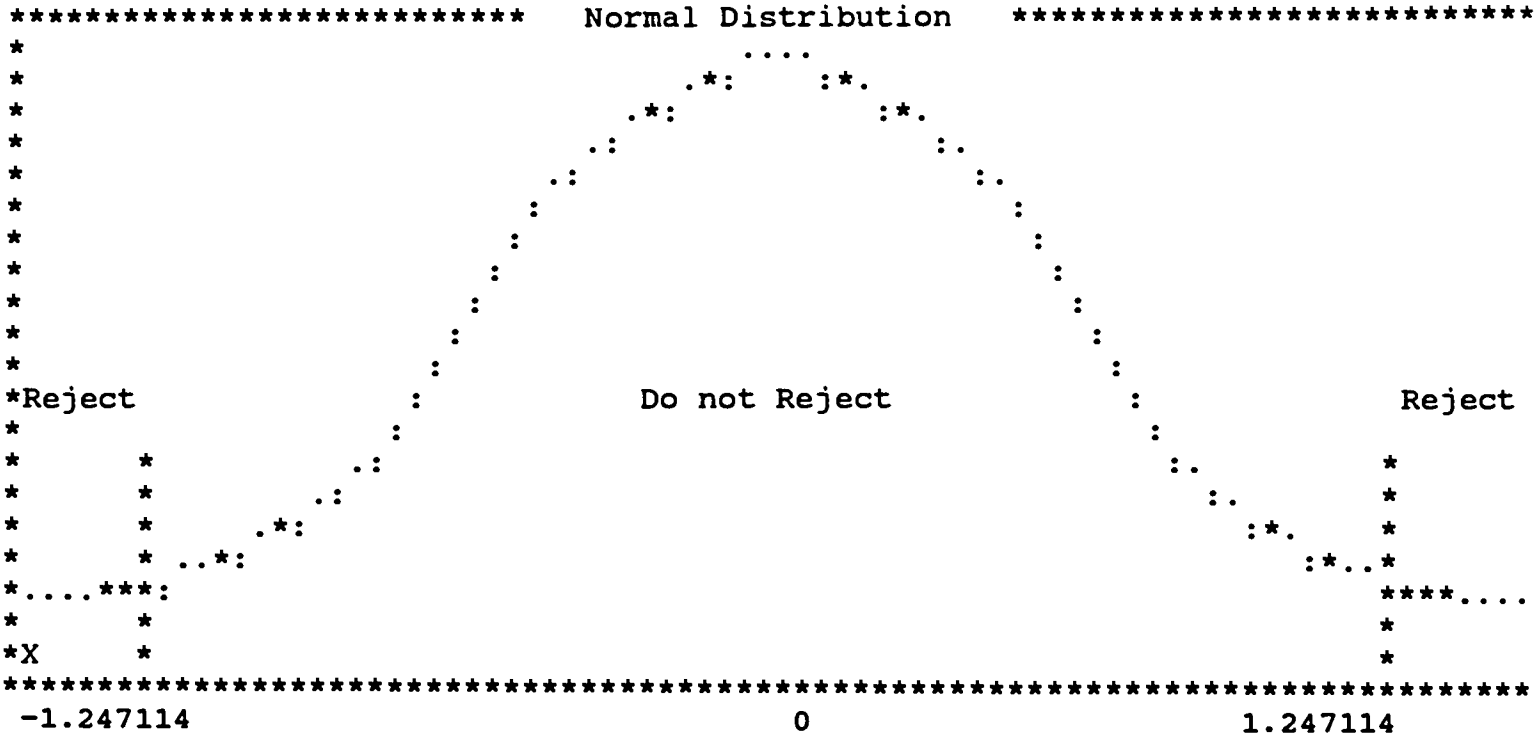
Test Procedure:	Two Sided
Alpha Error:	0.0500
Critical Z (Test Statistic - alpha/2):	1.9600
Hypothesis Value:	0
Sample Size for Group 1:	63
Sample Size for Group 2:	63
Mean for Group 1:	8.9683
Mean for Group 2:	13.5714
Standard Deviation (S) for Group 1:	2.9837
Standard Deviation (S) for Group 2:	4.0748

	macpr	macpo		macpr	macpo		macpr	macpo		macpr	macpo
1 =	7	13	20 =	7	11	39 =	9	16	58 =	7	7
2 =	8	14	21 =	4	10	40 =	10	8	59 =	6	11
3 =	7	8	22 =	12	14	41 =	9	20	60 =	6	10
4 =	10	15	23 =	12	11	42 =	12	16	61 =	12	15
5 =	10	9	24 =	7	19	43 =	10	6	62 =	12	14
6 =	8	18	25 =	12	8	44 =	13	13	63 =	3	8
7 =	5	13	26 =	8	12	45 =	13	16			
8 =	8	12	27 =	10	16	46 =	6	8			
9 =	11	13	28 =	10	14	47 =	9	21			
10 =	10	16	29 =	7	9	48 =	10	13			
11 =	7	16	30 =	2	13	49 =	11	13			
12 =	11	17	31 =	12	18	50 =	7	17			
13 =	13	14	32 =	14	26	51 =	7	17			
14 =	13	12	33 =	9	12	52 =	11	12			
15 =	9	8	34 =	9	13	53 =	11	18			
16 =	12	16	35 =	7	9	54 =	7	17			
17 =	9	17	36 =	7	9	55 =	9	12			
18 =	6	13	37 =	7	14	56 =	5	17			
19 =	4	12	38 =	19	25	57 =	7	11			

Results

Standard Error of Mean (unequal variances):	0.6363
Lower Limit:	-1.2471
Upper Limit:	1.2471
Standard Error of Mean (equal variances):	0.6363
Lower Limit:	-1.2471
Upper Limit:	1.2471
Mean 1 - Mean 2:	-4.6032
Degrees of Freedom:	124
Critical Z (Test Statistic - alpha/2):	1.9600
Computed Z (unequal variances):	-7.2345
p value:	0.0002

Conclusion: Reject Hypothesis


Normal Distribution
Reject
Do not Reject
Reject
X
-1.247114
0
1.247114

CBS-Hypothesis Testing I-MACBO 07-07-1996 - 14:27:34

Information Entered

Test Procedure:	Two Sided
Alpha Error:	0.0500
Critical Z (Test Statistic - alpha/2):	1.9600
Hypothesis Value:	0
Sample Sizes:	63
Mean of Differences:	-4.6032
Standard Deviation (S) of Differences:	3.9739

	macpr	macpo	diff		macpr	macpo	diff		macpr	macpo	diff
1 =	7	13	-6	20 =	7	11	-4	39 =	9	16	-7
2 =	8	14	-6	21 =	4	10	-6	40 =	10	8	2
3 =	7	8	-1	22 =	12	14	-2	41 =	9	20	-11
4 =	10	15	-5	23 =	12	11	1	42 =	12	16	-4
5 =	10	9	1	24 =	7	19	-12	43 =	10	6	4
6 =	8	18	-10	25 =	12	8	4	44 =	13	13	0
7 =	5	13	-8	26 =	8	12	-4	45 =	13	16	-3
8 =	8	12	-4	27 =	10	16	-6	46 =	6	8	-2
9 =	11	13	-2	28 =	10	14	-4	47 =	9	21	-12
10 =	10	16	-6	29 =	7	9	-2	48 =	10	13	-3
11 =	7	16	-9	30 =	2	13	-11	49 =	11	13	-2
12 =	11	17	-6	31 =	12	18	-6	50 =	7	17	-10
13 =	13	14	-1	32 =	14	26	-12	51 =	7	17	-10
14 =	13	12	1	33 =	9	12	-3	52 =	11	12	-1
15 =	9	8	1	34 =	9	13	-4	53 =	11	18	-7
16 =	12	16	-4	35 =	7	9	-2	54 =	7	17	-10
17 =	9	17	-8	36 =	7	9	-2	55 =	9	12	-3
18 =	6	13	-7	37 =	7	14	-7	56 =	5	17	-12
19 =	4	12	-8	38 =	19	25	-6	57 =	7	11	-4

	macpr	macpo	diff
58 =	7	7	0
59 =	6	11	-5
60 =	6	10	-4
61 =	12	15	-3
62 =	12	14	-2
63 =	3	8	-5

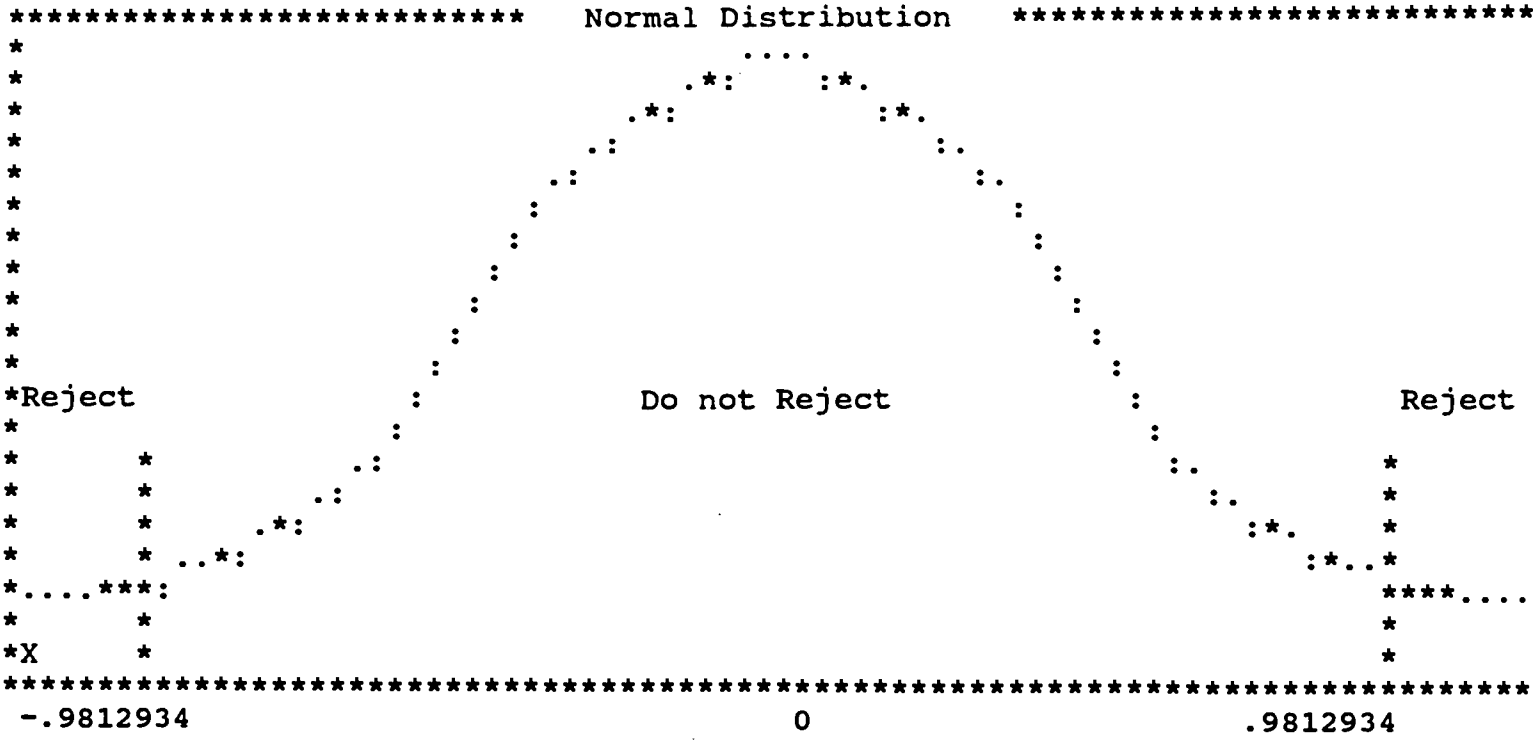
Results

Standard Error of Mean:	0.5007
Lower Limit:	-0.9813
Hypothesis Value:	0
Upper Limit:	0.9813
Mean of differences:	-4.6032
Alpha Error:	0.0500
Degrees of Freedom:	62
Critical Z (Test Statistic - alpha/2):	1.9600
Computed Z:	-9.1942
p value:	0.0002

Conclusion: Reject Hypothesis

Power Curve

	Actual	Beta	1-Beta
1	-4.9760	0.0233	0.9767
2	-2.9787	0.1610	0.8390
3	-0.9813	0.5000	0.5000
4	1.0161	0.8390	0.1610
5	3.0134	0.9767	0.0233


Normal Distribution
Reject
Do not Reject
Reject
-.9812934
0
.9812934

CBS-Analysis of Variance — ANOVA for GCC Pre & Posttest Scores in Macroeconomics - 14:35:14

Information Entered

Number of Variables:	1
Number of Columns:	2
Alpha Error:	.05

	macpr	macpo		macpr	macpo		macpr	macpo		macpr	macpo
1 =	7	13	13 =	13	14	25 =	12	8	37 =	7	14
2 =	8	14	14 =	13	12	26 =	8	12	38 =	19	25
3 =	7	8	15 =	9	8	27 =	10	16	39 =	9	16
4 =	10	15	16 =	12	16	28 =	10	14	40 =	10	8
5 =	10	9	17 =	9	17	29 =	7	9	41 =	9	20
6 =	8	18	18 =	6	13	30 =	2	13	42 =	12	16
7 =	5	13	19 =	4	12	31 =	12	18	43 =	10	6
8 =	8	12	20 =	7	11	32 =	14	26	44 =	13	13
9 =	11	13	21 =	4	10	33 =	9	12	45 =	13	16
10 =	10	16	22 =	12	14	34 =	9	13	46 =	6	8
11 =	7	16	23 =	12	11	35 =	7	9	47 =	9	21
12 =	11	17	24 =	7	19	36 =	7	9	48 =	10	13

	macpr	macpo
49 =	11	13
50 =	7	17
51 =	7	17
52 =	11	12
53 =	11	18
54 =	7	17
55 =	9	12
56 =	5	17
57 =	7	11
58 =	7	7
59 =	6	11
60 =	6	10
61 =	12	15
62 =	12	14
63 =	3	8

Results

Source of Variance	Sum of Squares	Degrees of Freedom	Mean Squared	Computed F-Value
Columns:	667.460	1	667.460	52.338
Error:	1,581.365	124	12.753	
Totals:	2,248.825	125		

Critical F (Col): 3.91999 — Reject Null Hypothesis

CBS-Chi-Square Analysis I-MACBO 07-07-1996 - 14:49:35

Information Entered

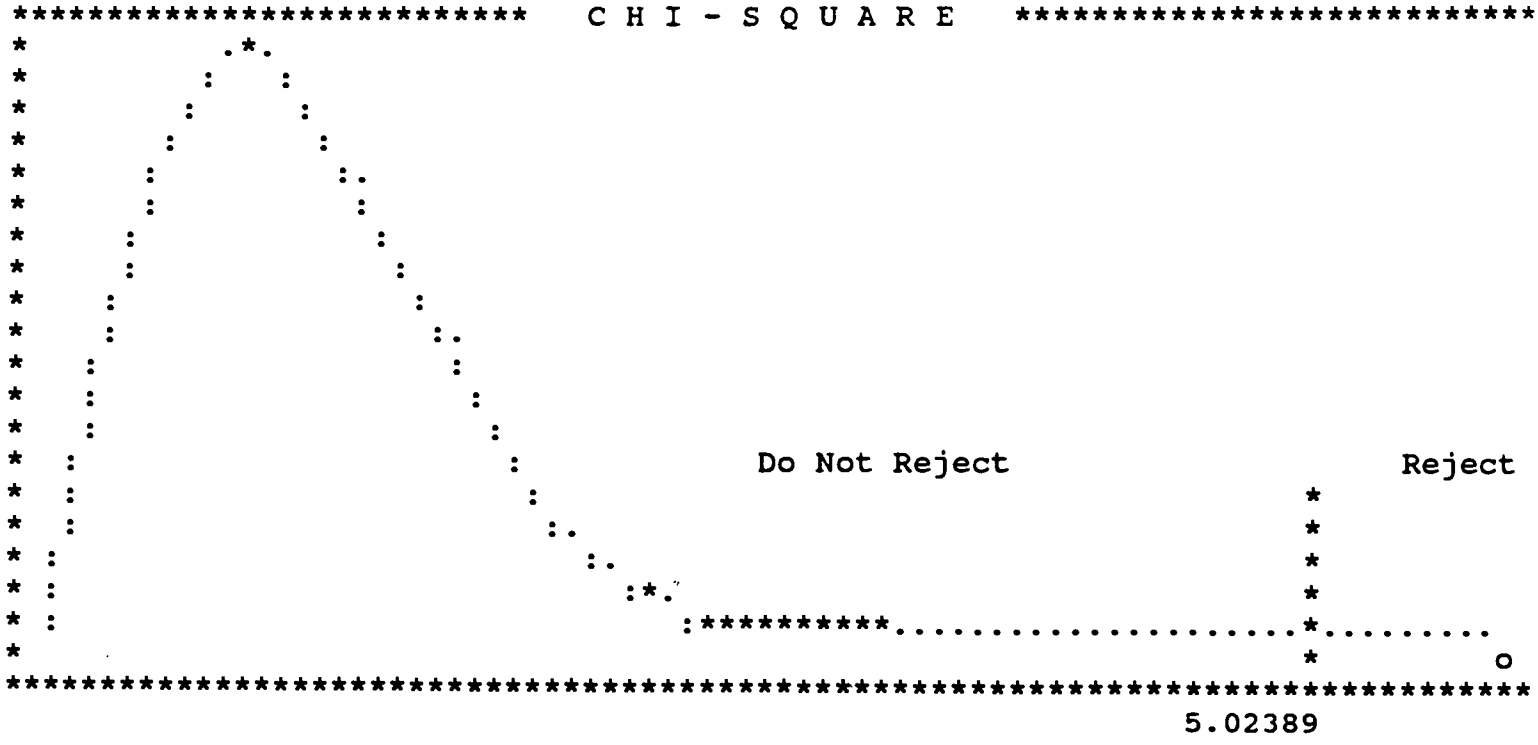
Number of Rows:	2
Alpha Error:	.025
Degrees of Freedom:	1
Critical chi-square:	5.02389

	macpo	macpr
1 =	40	62
2 =	23	1

Results

Critical chi-square:	5.0239
Computed chi-square:	491.8065
p value:	0.0001

Conclusion: Reject Hypothesis


C H I - S Q U A R E
Do Not Reject
Reject
5.02389

APPENDIX G

CBS-NonPara

Nonparametric Test of GCC Pre & Posttest Scores in Macroeconomics _4:38:21

Information Entered

Test Method: Wilcoxon Rank-Sum Test
Alpha Error: .05

	macpr	macpo		macpr	macpo		macpr	macpo		macpr	macpo
1 =	7	13	14 =	13	12	27 =	10	16	40 =	10	8
2 =	8	14	15 =	9	8	28 =	10	14	41 =	9	20
3 =	7	8	16 =	12	16	29 =	7	9	42 =	12	16
4 =	10	15	17 =	9	17	30 =	2	13	43 =	10	6
5 =	10	9	18 =	6	13	31 =	12	18	44 =	13	13
6 =	8	18	19 =	4	12	32 =	14	26	45 =	13	16
7 =	5	13	20 =	7	11	33 =	9	12	46 =	6	8
8 =	8	12	21 =	4	10	34 =	9	13	47 =	9	21
9 =	11	13	22 =	12	14	35 =	7	9	48 =	10	13
10 =	10	16	23 =	12	11	36 =	7	9	49 =	11	13
11 =	7	16	24 =	7	19	37 =	7	14	50 =	7	17
12 =	11	17	25 =	12	8	38 =	19	25	51 =	7	17
13 =	13	14	26 =	8	12	39 =	9	16	52 =	11	12

	macpr	macpo
53 =	11	18
54 =	7	17
55 =	9	12
56 =	5	17
57 =	7	11
58 =	7	7
59 =	6	11
60 =	6	10
61 =	12	15
62 =	12	14
63 =	3	8

Results

	r1	r2		r1	r2		r1	r2
1 =	19	89	17 =	42.5	114.5	33 =	42.5	75
2 =	31.5	99	18 =	9	89	34 =	42.5	89
3 =	19	31.5	19 =	3.5	75	35 =	19	42.5
4 =	53.5	103.5	20 =	19	63	36 =	19	42.5
5 =	53.5	42.5	21 =	3.5	53.5	37 =	19	99
6 =	31.5	119	22 =	75	99	38 =	121.5	125
7 =	5.5	89	23 =	75	63	39 =	42.5	108
8 =	31.5	75	24 =	19	121.5	40 =	53.5	31.5
9 =	63	89	25 =	75	31.5	41 =	42.5	123
10 =	53.5	108	26 =	31.5	75	42 =	75	108
11 =	19	108	27 =	53.5	108	43 =	53.5	9
12 =	63	114.5	28 =	53.5	99	44 =	89	89
13 =	89	99	29 =	19	42.5	45 =	89	108
14 =	89	75	30 =	1	89	46 =	9	31.5
15 =	42.5	31.5	31 =	75	119	47 =	42.5	124
16 =	75	108	32 =	99	126	48 =	53.5	89

	r1	r2
49 =	63	89
50 =	19	114.5
51 =	19	114.5
52 =	63	75
53 =	63	119
54 =	19	114.5
55 =	42.5	75
56 =	5.5	114.5
57 =	19	63
58 =	19	19
59 =	9	63
60 =	9	53.5
61 =	75	103.5
62 =	75	99
63 =	2	31.5

Test Method:	Wilcoxon Rank-Sum Test
Alpha Error:	.05
Population Mean:	4,000.5000
Standard Deviation:	204.9518
Sum of Group #1:	2,708.5000
Sum of Group #2:	5,292.5000
Standard Error:	401.7056
Critical Upper Limit:	4,402.2056
Critical Lower Limit:	3,598.7944

Conclusion: Reject Hypothesis

CBS-NonParametric Methods I-MACBO 07-07-1996 - 1

Information Entered

Test Method: Wilcoxon Signed-Rank Test
Alpha Error: .05

	macpr	macpo		macpr	macpo		macpr	macpo		macpr	macpo
1 =	7	13	14 =	13	12	27 =	10	16	40 =	10	8
2 =	8	14	15 =	9	8	28 =	10	14	41 =	9	20
3 =	7	8	16 =	12	16	29 =	7	9	42 =	12	16
4 =	10	15	17 =	9	17	30 =	2	13	43 =	10	6
5 =	10	9	18 =	6	13	31 =	12	18	44 =	13	13
6 =	8	18	19 =	4	12	32 =	14	26	45 =	13	16
7 =	5	13	20 =	7	11	33 =	9	12	46 =	6	8
8 =	8	12	21 =	4	10	34 =	9	13	47 =	9	21
9 =	11	13	22 =	12	14	35 =	7	9	48 =	10	13
10 =	10	16	23 =	12	11	36 =	7	9	49 =	11	13
11 =	7	16	24 =	7	19	37 =	7	14	50 =	7	17
12 =	11	17	25 =	12	8	38 =	19	25	51 =	7	17
13 =	13	14	26 =	8	12	39 =	9	16	52 =	11	12

	macpr	macpo
53 =	11	18
54 =	7	17
55 =	9	12
56 =	5	17
57 =	7	11
58 =	7	7
59 =	6	11
60 =	6	10
61 =	12	15
62 =	12	14
63 =	3	8

Results

	rank	diff		rank	diff		rank	diff		rank	diff
1 =	39.5	6	17 =	49	8	33 =	19	3	49 =	12	2
2 =	39.5	6	18 =	45.5	7	34 =	27	4	50 =	53.5	10
3 =	4	1	19 =	49	8	35 =	12	2	51 =	53.5	10
4 =	34	5	20 =	27	4	36 =	12	2	52 =	4	1
5 =	-4	-1	21 =	39.5	6	37 =	45.5	7	53 =	45.5	7
6 =	53.5	10	22 =	12	2	38 =	39.5	6	54 =	53.5	10
7 =	49	8	23 =	-4	-1	39 =	45.5	7	55 =	19	3
8 =	27	4	24 =	59.5	12	40 =	-12	-2	56 =	59.5	12
9 =	12	2	25 =	-27	-4	41 =	56.5	11	57 =	27	4
10 =	39.5	6	26 =	27	4	42 =	27	4	58 =	0	0
11 =	51	9	27 =	39.5	6	43 =	-27	-4	59 =	34	5
12 =	39.5	6	28 =	27	4	44 =	0	0	60 =	27	4
13 =	4	1	29 =	12	2	45 =	19	3	61 =	19	3
14 =	-4	-1	30 =	56.5	11	46 =	12	2	62 =	12	2
15 =	-4	-1	31 =	39.5	6	47 =	59.5	12	63 =	34	5
16 =	27	4	32 =	59.5	12	48 =	19	3			

Test Method:	Wilcoxon Signed-Rank Test
Alpha Error:	.05
Population Mean:	0
Standard Deviation:	32.7465
Sum of Signed Ranks:	1,727
Critical Upper Limit:	64.1831
Critical Lower Limit:	-64.1831

Conclusion: Reject Hypothesis

TABLE 1. Specification Matrix for 33-Item Macro TUCE III

Content Categories	Cognitive Categories: Recognition & Understanding	Cognitive Categories: Explicit Application	Cognitive Categories: Implicit Application	No. of Questions
A. Measuring Aggregate Economic Performance	1	2	(12)	3
B. Aggregate Supply, Productive Capacity, and Economic Growth	7, 18	3	(17)	4
C. Income and Expenditure Approach to Aggregate Demand and Fiscal Policy	(6), 8, 10, 21	9,* 30	(22), (25)	7 1/2
D. Monetary Approach to Aggregate Demand and Monetary Policy	11, 16, 26	(4), 5, 14, 19, 27	(20)	9
E. Policy Combinations		13	15, (23), (24), 28, 29	6
F. International Economics	31	9,* 33	(32)	3 1/2
Number of Questions	11	11	11	33

"Realistic" questions are circled.
No. of "Realistic" questions = 10. No. of times each alternative is correct: A = 9; B = 8; C = 8; D = 8
* Question 9 is classified 1/2 C and 1/2 F.

CONTENT SPECIFICATIONS

Macro

The content categories used to classify the macroeconomic questions are:

A. ***Measuring Aggregate Economic Performance*** (GNP accounting; "deflating" to distinguish between real and nominal dollar measures)

B. ***Aggregate Supply, Productive Capacity, and Economic Growth*** (productive resources, savings, investment, and productivity)

C. ***Income and Expenditure Approach to Aggregate Demand and Fiscal Policy*** ($C + I + G + (X - M) = GNP = P \cdot Q$, savings, investment, and the multiplier)

D. ***Monetary Approach to Aggregate Demand and Monetary Policy*** ($M \cdot V = GNP = P \cdot Q$, money, banking, expectations, and the velocity of circulation)

E. ***Policy Combinations*** (the monetary-fiscal policy mix, including automatic stabilization)

F. ***International Economics*** (balance of trade and balance of payments, tariffs, exchange rates)

Micro

The content categories used to classify the microeconomic questions are:

A. ***The Basic Economic Problem*** (scarcity, opportunity cost, and economic efficiency)

B. ***Markets and the Price Mechanism*** (basic supply and demand analysis including price elasticity, marginal utility)

C. ***Costs, Revenue, Profit Maximization, and Market Structure*** (marginal analysis, fixed cost, monopoly and competition)

D. ***Market Failures, Externalities, Government Intervention and Regulation*** (public goods, externalities, and inefficiencies of overregulation and underregulation)

E. ***Income Distribution and Government Redistribution Policies*** (factor markets and effects of taxes, transfers, and subsidies)

F. ***International Economics*** (comparative advantage, tariffs, exchange rates)

The main purpose of these necessarily broad categories is to ensure adequate coverage of the basic content of "typical" college principles courses so that the *total raw score* can be deemed to measure *general understanding* of basic economics principles. Individual questions on TUCE III often deal with more than one concept or principle, and this makes simple content classifications difficult. In cases where the correct alternative deals with a concept or principle in one category and incorrect alternatives deal with concepts or principles in other categories, we have generally classified the question in the category corresponding to the correct alternative. In three cases, however, the interaction between the alternatives and the situation posed in the stem was sufficiently complex to justify classifying the question in two different content categories (macro #9, and micro #9 and #30, as shown in Tables 1 and 2).

The heavy emphasis on application questions that has characterized all editions of the TUCE may give the broad content categories as described above the appearance of a somewhat stronger policy orientation than is typical in many principles courses. A detailed examination of individual questions, however, will reveal that the policy context is used to test knowledge of and ability to use underlying concepts and principles, not to support or oppose particular policy proposals or to advocate or oppose "intervention" or "fine-tuning" in general.

Individual questions in different content categories vary in difficulty and in their cognitive classification as explained below, so no attempt should be made to make sweeping generalizations about student knowledge of individual concepts or principles based on a single question or even a small number of questions. It is worth repeating that TUCE III is designed so that the *total raw score* can serve as a *general* measure of economic understanding and discriminate among individual students on the basis of their ability to understand and apply selected concepts and principles. If individual researchers or individual instructors find that the fixed-weight content specifications of these tests are not appropriate for their circumstances, they should use the detailed item analysis data discussed below to help interpret their results, or perhaps to modify the tests. Modifications of TUCE III, however, are likely to invalidate the usefulness of the national norming and reliability data discussed below.

COGNITIVE SPECIFICATIONS

As indicated above, all editions of the TUCE have sought to emphasize the *application* of basic concepts and principles. The chair of the original TUCE committee noted: "The test will emphasize the ability to apply economic principles to real problems, including issues of public policy" (Fels, 1967, p. 664). As indicated in Tables 1 and 2, two-thirds of the questions on TUCE III are classified as application questions, and roughly half of the application questions (10 macro questions and 11 micro questions) are classified as "realistic." A realistic question is defined as one that uses a quotation taken or adapted from an actual published source or a "manufactured" quotation that might easily have appeared in such a source. In three cases (macro #17 and #20, and micro #2), an actual situation is described in the stem without quotation marks being used.

The three broad cognitive categories used to classify questions on TUCE III are: Recognition and Understanding (RU); Explicit Application (EA); and Implicit Application (IA).[2] Each of these categories is further specified as follows:

(RU) Recognizes and Understands Basic Terms, Concepts, and Principles

1.1 Selects the best definition of a given economic term, concept, or principle

1.2 Selects the economic term, concept, or principle that best fits a given definition

1.3 Identifies or associates terms that have closely related meanings

1.4 Recalls or recognizes specific economic rules, e.g., an individual firm's profit is maximized at that level of output at which marginal cost equals marginal revenue

(EA) Explicit Application of Basic Terms, Concepts, and Principles

2.1 Applies economic concepts needed to define or solve a particular problem when the concepts are explicitly mentioned

2.2 Distinguishes between correct and incorrect application of economic concepts that are specifically given

2.3 Distinguishes between probable and improbable outcomes of specific economic actions or proposals involving no unstated assumptions

2.4 Judges the adequacy with which conclusions are supported by data or analysis involving no unstated assumptions

(IA) Implicit Application of Basic Terms, Concepts, and Principles

3.1 Applies economic concepts needed to define or solve a particular problem when the concepts are not explicitly mentioned

3.2 Distinguishes between correct and incorrect application of economic concepts that are not specifically given

3.3 Distinguishes between probable and improbable outcomes of specific economic actions or proposals involving unstated assumptions

3.4 Judges the adequacy with which conclusions are supported by data or analysis involving unstated assumptions

These definitions are very similar to the ones used on TUCE II, except that some questions on that test involved the ability to deal with extraneous information presented in the question stem. Complaints about the use of extraneous information in multiple-choice questions and the length of questions that included such information were sufficiently strong to persuade the committee to drop that skill from the specification criteria for TUCE III.

As with the content categories described above, there are some questions for which the cognitive classification is not completely clear-cut. Whether or not the mental processes used by students to answer these questions actually correspond to their cognitive classification cannot be known with certainty; and any question for which a student has seen the correct answer can become a memory or a recall question, regardless of its cognitive classification. Nevertheless, the main purpose of the overall cognitive specifications is to ensure, so

[2] As the detailed specifications in the text indicate, our "Recognition and Understanding" category is a combination of the first two categories in Bloom's *Taxonomy of Educational Objectives* (Bloom, 1956), and our "Explicit Application" and "Implicit Application" categories are refinements of the third category in Bloom's taxonomy. The six categories of Bloom's taxonomy are: Knowledge, Comprehension, Application, Analysis, Synthesis, and Evaluation. As originally defined, only the first three categories of objectives can be tested with multiple-choice questions. The first edition of TUCE used the categories "Simple Application" and "Complex Application" (Fels, 1967, pp. 664–66) instead of the current "Explicit Application" and "Implicit Application."

far as is practically possible, that a large number of questions require students to go beyond memorization and recall. We think that under ordinary circumstances the total raw score on TUCE III can be a useful measure of a student's general ability to *understand* and *apply* economic terms, concepts, and principles.

It should be emphasized that there is no necessary or direct relation between the kind of thinking or kind of knowledge being tested and the difficulty of a particular question. As Table 4 indicates, there are hard questions and easy questions in each cognitive category. Both the hardest question (#10) and the easiest question (#16) on the macro posttest are classified as RU questions. On the micro posttest, the hardest question (#16) is classified as an EA question and the easiest question (#6) is classified as an IA question.

ITEM CONSTRUCTION

Three sample questions are shown below to illustrate each cognitive category, to indicate how individual test items are constructed on TUCE III, and to demonstrate how the detailed item analysis data presented in Tables 7, 9, 11, and 13 can be interpreted. The data following each sample question approximate overall mean performance on TUCE III and show the percentage of students in our norming samples selecting each alternative before (pre) and after (post) they took a principles of economics course; the point biserial correlation between the mean score of those selecting the correct alternative (shown in **boldface**) on that question and the mean score of the total norm group on the appropriate form of TUCE III (R_t); and the point biserial correlation between the mean score of those selecting the correct alternative on that question and the mean score of the total norm group on the other questions in the same cognitive category on the appropriate form of TUCE III (R_c).[3]

Macro Question #8. Content Category "C." Cognitive Category "RU."

In comparing an increase in government spending on goods and services to an increase in private investment spending, we can correctly say that in the short run:

A. they will both shift aggregate supply.
B. they will both shift aggregate demand.
C. government spending is inflationary; private investment is not.
D. government spending must equal taxes; private investment must equal saving.

Pre	*Post*
25%	17%
29%	**50%**
22%	15%
24%	18%
$R_t = .20$	$R_t = .38$
$R_c = .33$	$R_c = .44$

Micro Question #9. Content Categories "B" and "C." Cognitive Category "EA."

If all of the firms producing a product in a perfectly competitive market are required to adopt antipollution devices that increase their cost of production, one would expect:

A. the demand for the product to fall.
B. the market supply curve to shift to the left.
C. the long-run economic profits of the individual firms to fall.
D. the short-run economic profits of the individual firms to remain unchanged.

Pre	*Post*
11%	9%
39%	**56%**
36%	25%
14%	10%
$R_t = .33$	$R_t = .44$
$R_c = .43$	$R_c = .50$

Macro Question #25. Content Category "C." Cognitive Category "IA," "Realistic."

"I have promised to do everything in my power to reduce the federal deficit. That means reducing federal expenditures and, if necessary, increasing taxes. Under present conditions of full employment and steady prices, we can afford to bear the

[3]The formula for a point biserial correlation between an individual test item, g, and the total test score (R_t) is:

$$R_{X_g} = [\bar{X}_g - \bar{X}/S_x]\sqrt{P_g/Q_g}$$

where $\bar{X}_g$ = mean score of those answering item g correctly; $\bar{X}$ = mean score of the total test; S_x = standard deviation on the total test; P_g = proportion answering item g correctly; $Q_g = 1 - P_g$. The formula for R_c is the same except that $\bar{x}$ = mean score on all the items in the same cognitive category as g, and S_x = standard deviation on all the items in the same cognitive category as g.

TABLE 4. Pre- and Posttest Performance on TUCE III by Cognitive Classification of Questions

	Pretest			Posttest		
	Mean Raw Score	Mean % Correct	Range of % Correct on Individual Questions	Mean Raw Score	Mean % Correct	Range of % Correct on Individual Questions
Macro						
30 Questions*	9.18	30.6	12–52	14.31	47.7	20–78
10 RU	3.17	31.7	12–51	5.34	53.4	20–78
10 EA	3.56	35.6	21–52	4.94	49.4	36–61
10 IA	2.44	24.4	14–37	4.03	40.3	28–53
33 Questions**	10.57	32.0	12–52	15.15	45.9	19–75
11 RU	3.61	32.8	12–52	5.50	50.0	19–75
11 EA	4.02	36.5	22–51	5.30	48.2	36–57
11 IA	2.93	26.6	13–45	4.35	39.5	28–57
Micro						
30 Questions†	10.71	35.7	9–67	15.36	51.2	35–76
10 RU	3.40	34.0	16–58	4.96	49.6	36–69
10 EA	3.19	31.9	19–56	4.85	48.5	35–67
10 IA	4.11	41.1	9–67	5.54	55.4	38–76
33 Questions††	12.35	37.4	10–67	16.67	50.5	33–77
10 RU	3.53	35.3	17–59	4.86	48.6	36–69
12 EA	4.10	34.2	19–58	5.71	47.6	33–67
11 IA	4.72	42.9	10–67	6.10	55.5	37–77

* N = 2,724. Weighted Selectivity Index = 47.65
** N = 1,324. Weighted Selectivity Index = 44.12
† N = 2,726. Weighted Selectivity Index = 49.49
†† N = 1,426. Weighted Selectivity Index = 49.89

CBS-Descriptive Statistics I-MACND 07-07-1996 - 15:28:07

Information Entered

Data Form: Raw
Number of Data Points: 84

	macnd		macnd		macnd		macnd		macnd		macnd
1 =	7	14 =	7	27 =	12	40 =	2	53 =	6	66 =	7
2 =	11	15 =	11	28 =	10	41 =	12	54 =	3	67 =	7
3 =	8	16 =	13	29 =	6	42 =	14	55 =	12	68 =	11
4 =	7	17 =	13	30 =	7	43 =	9	56 =	10	69 =	11
5 =	10	18 =	9	31 =	12	44 =	8	57 =	13	70 =	7
6 =	10	19 =	12	32 =	7	45 =	9	58 =	13	71 =	11
7 =	8	20 =	9	33 =	8	46 =	7	59 =	8	72 =	9
8 =	13	21 =	9	34 =	10	47 =	7	60 =	7	73 =	5
9 =	5	22 =	6	35 =	6	48 =	19	61 =	6	74 =	7
10 =	8	23 =	4	36 =	10	49 =	8	62 =	9	75 =	7
11 =	11	24 =	7	37 =	7	50 =	9	63 =	10	76 =	6
12 =	8	25 =	4	38 =	7	51 =	9	64 =	11	77 =	8
13 =	10	26 =	12	39 =	11	52 =	10	65 =	7	78 =	10

	macnd
79 =	8
80 =	6
81 =	12
82 =	12
83 =	3
84 =	7

Results

Mean:	8.7738
Median:	8.5000
Mode:	7
Range:	17
Variance (S):	7.9844
Standard Deviation (S):	2.8257
Coefficient of Skewness:	0.3639
Coefficient of Kurtosis:	3.8714

CBS-Descriptive Statistics I-MAPOT 07-07-1996 - 15:44:21

Information Entered

Data Form: Raw
Number of Data Points: 66

	mapoc		mapoc		mapoc		mapoc		mapoc		mapoc
1 =	13	14 =	12	27 =	12	40 =	20	53 =	12	66 =	14
2 =	14	15 =	8	28 =	16	41 =	16	54 =	18		
3 =	8	16 =	16	29 =	14	42 =	8	55 =	17		
4 =	15	17 =	10	30 =	9	43 =	16	56 =	12		
5 =	9	18 =	17	31 =	13	44 =	6	57 =	17		
6 =	18	19 =	13	32 =	18	45 =	13	58 =	11		
7 =	13	20 =	12	33 =	26	46 =	16	59 =	7		
8 =	12	21 =	11	34 =	12	47 =	8	60 =	11		
9 =	13	22 =	10	35 =	13	48 =	21	61 =	10		
10 =	16	23 =	14	36 =	9	49 =	13	62 =	15		
11 =	16	24 =	11	37 =	9	50 =	13	63 =	14		
12 =	17	25 =	19	38 =	14	51 =	17	64 =	8		
13 =	14	26 =	8	39 =	25	52 =	7	65 =	11		

Results

Mean:	13.3333
Median:	13
Mode:	13
Range:	20
Variance (S):	16.5641
Standard Deviation (S):	4.0699
Coefficient of Skewness:	0.6551
Coefficient of Kurtosis:	3.6637

APPENDIX L

Comparison of National Precourse Cognitive Scores with GCC Students in Macro

Information Entered

Test Method:	Wilcoxon Rank-Sum Test
Alpha Error:	.05

	X1	X2
1 =	0.317	0.295
2 =	0.356	0.345
3 =	0.244	0.233

Results

	r1	r2
1 =	4	3
2 =	6	5
3 =	2	1

Test Method:	Wilcoxon Rank-Sum Test
Alpha Error:	.05
Population Mean:	10.5000
Standard Deviation:	2.2913
Sum of Group #1:	12
Sum of Group #2:	9
Standard Error:	4.4909
Critical Upper Limit:	14.9909
Critical Lower Limit:	6.0091

Conclusion: Do not Reject Hypothesis

Information Entered

Test Method: Wilcoxon Rank-Sum Test
Alpha Error: .05

	pre	post
1 =	0.295	0.525
2 =	0.345	0.442
3 =	0.233	0.365

Results

	r1	r2
1 =	2	6
2 =	3	5
3 =	1	4

Test Method: Wilcoxon Rank-Sum Test
Alpha Error: .05

Population Mean: 10.5000

Standard Deviation: 2.2913

Sum of Group #1: 6

Sum of Group #2: 15

Standard Error: 4.4909

Critical Upper Limit: 14.9909

Critical Lower Limit: 6.0091

Conclusion: Reject Hypothesis

APPENDIX N

Comparison of National Postcourse Cognitive Scores with GCC Students in Macro - 12:50:26

Information Entered

Test Method:	Wilcoxon Rank-Sum Test
Alpha Error:	.05

	natl	econ
1 =	0.534	0.525
2 =	0.494	0.442
3 =	0.403	0.365

Results

	r1	r2
1 =	6	5
2 =	4	3
3 =	2	1

Test Method:	Wilcoxon Rank-Sum Test
Alpha Error:	.05
Population Mean:	10.5000
Standard Deviation:	2.2913
Sum of Group #1:	12
Sum of Group #2:	9
Standard Error:	4.4909
Critical Upper Limit:	14.9909
Critical Lower Limit:	6.0091

Conclusion: Do not Reject Hypothesis

APPENDIX O

Comparison of Mean Pre & Post Content Scores for GCC Students using Wilcoxon Rank Sum Test

Test Method: Wilcoxon Rank-Sum Test
Alpha Error: .05

	pre	post
1 =	0.361	0.530
2 =	0.345	0.469
3 =	0.302	0.378
4 =	0.264	0.474
5 =	0.246	0.426

Results

	r1	r2
1 =	5	10
2 =	4	8
3 =	3	6
4 =	2	9
5 =	1	7

Test Method: Wilcoxon Rank-Sum Test
Alpha Error: .05

Population Mean: 27.5000

Standard Deviation: 4.7871

Sum of Group #1: 15

Sum of Group #2: 40

Standard Error: 9.3828

Critical Upper Limit: 36.8828

Critical Lower Limit: 18.1172

Conclusion: Reject Hypothesis

APPENDIX P

Comparison of Mean Pre & Post Content Scores for GCC Students using Wilcoxon Signed Rank Test

Test Method: Wilcoxon Signed-Rank Test
Alpha Error: .05

	pre	post
1 =	0.361	0.530
2 =	0.345	0.469
3 =	0.302	0.378
4 =	0.264	0.474
5 =	0.246	0.426

Results

	rank	diff
1 =	3	0.169
2 =	2	0.124
3 =	1	0.076
4 =	5	0.210
5 =	4	0.180

Test Method: Wilcoxon Signed-Rank Test
Alpha Error: .05

Population Mean: 0

Standard Deviation: 7.4162

Sum of Signed Ranks: 15

Critical Upper Limit: 14.5357

Critical Lower Limit: -14.5357

Conclusion: Reject Hypothesis

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