

Multiple Choice Section: 17 questions (3 points each) for a total of 51 points. Circle the correct answer on the test (for your reference later) and then enter it in the appropriate location on the Scantron form. Your answers on this portion of the test will be graded by Scantron only.

1. The number 327.68 is which of the following in scientific notation?

- A.  $3.2768 \times 10^2$
- B.  $32768 \times 10^{-2}$
- C.  $32.768 \times 10^1$
- D. 327.68

2. Suppose you deposit \$1500 into an account with an APR of 7 % and monthly compounding. Find the annual percentage yield (APY).

- A. 7.74%
- B. 7.23 %
- C. 49.36 %
- D. 97.46%

3. Calculate the monthly payment needed to pay off a student loan of \$33,107.00 at a fixed APR of 6% in thirteen years.

- A. \$306.15
- B. \$165.50
- C. \$367.50
- D. \$140.61

4. A player's batting average is computed by dividing the number of hits by the number of times he is "at bat." The table below shows the batting averages for two players, Michael and Justin, during the 2006 and 2007 seasons.

Player	2006			2007		
	Hits	At-bats	Batting Average	Hits	At-bats	Batting Average
Michael	100	400	.250	45	150	.360
Justin	10	50	.200	180	580	.310

This table is an example of Simpson's paradox because:

- A. In the 2006 season, when Michael had more at-bats, Michael had a higher batting average than Justin, yet in the 2007 season, when Michael had fewer at-bats, he still had a higher batting average than Justin.
- B. When looking at the two years separately, Michael had the higher batting average, yet when looking at the two years combined, Justin had the higher batting average.
- C. When looking at the two years separately, Justin had the higher batting average, yet when looking at the two years combined, Michael had the higher batting average.
- D. This is not an example of Simpson's paradox.

5. You deposit \$500 into an account with an APR of 7.5 % and continuous compounding. How much would you have in your account after 54 months?
- A. \$700.72  
B. \$692.32  
C. \$28,698.73  
D. \$668.75
6. If you order 1 ton (2000 lbs) of gravel, but receive 2108 lbs, what is the relative error in the amount of gravel you received, compared to the amount you ordered?
- A. .054%  
B. 5.12%  
C. .051%  
 D. 5.40%

This CPI table should be used as a reference for the following two questions.

Year	CPI	Year	CPI	Year	CPI	Year	CPI
1982	96.5	1988	118.3	1994	148.2	2000	172.2
1983	99.6	1989	124.0	1995	152.4	2001	177.1
1984	103.9	1990	130.7	1996	156.9	2002	179.9
1985	107.6	1991	136.2	1997	160.5	2003	184.0
1986	109.6	1992	140.3	1998	163.0	2004	188.9
1987	113.6	1993	144.5	1999	166.6	2005	195.3

7. What would be a comparable salary in 2005 for a job which paid \$30,000 in 1995?
- A. \$42,357.05  
 B. \$38,444.88  
C. \$36,829.37  
D. \$30,288.00
8. Compute the inflation rate from 1988 to 1989.
- A. 4.82 %  
B. .048 %  
C. 4.60 %  
D. .046%
9. How much should you deposit now in an account with an APR of 5.5% and semiannual (twice per year) compounding, if you want to have \$100,000 in 20 years?
- A. \$1403.15  
B. \$4153.15  
 C. \$33,785.22  
D. \$33,287.11

10. If a map states 1 cm on the map equals 1 mile on the earth, what is the map's scale ratio?
- A. 1:63360
  - B. 1:160934.4
  - C. 1:5280
  - D. 1:2.54
11. Your total *annual income* is \$27,150. Your total *annual expenses* are \$27,950. What is your monthly cash flow?
- A. positive \$800
  - B. negative \$800
  - C. negative \$66.67
  - D. positive \$66.67

Tax rate	Single	Married filing jointly	Married filing separately	Head of household
10%	Up to \$7000	Up to \$14,000	Up to \$7000	Up to \$10,000
15%	Up to \$28,400	Up to \$56,800	Up to \$28,400	Up to \$38,050
25%	Up to \$68,800	Up to \$114,650	Up to \$57,325	Up to \$98,250
28%	Up to \$143,500	Up to \$174,700	Up to \$87,350	Up to \$159,100
33%	Up to \$311,950	Up to \$311,950	Up to \$155,975	Up to \$311,950
35%	More than \$311,950	More than \$311,950	More than \$155,975	More than \$311,950
Deduct	\$4750	\$9500	\$4750	\$7000
Exempt	\$3050	\$3050	\$3050	\$3050

12. Suppose you are single and you earned \$33,500 in wages. You received \$300 in interest on saving, and you contributed \$1500 to a tax deferred retirement account. Use the table above and determine which of these computations is correct.

	A.	B.	C.	<input checked="" type="radio"/> D.
Gross Income	\$33,800	\$32,300	\$32,300	\$33,800
Adjusted Gross Income	\$29,000	\$29,000	\$27,150	\$32,300
Taxable Income	\$22,250	\$19,750	\$24,500	\$24,500

13. The margin of error in a statistical study is used to compute:
- A. The proportion of times that the results are actually in error.
  - B. The proportion of times the results are actually correct.
  - C. The confidence interval that is likely to contain the true population parameter.
  - D. The percentage of observations that are recorded incorrectly.

14. Suppose you need a house mortgage of \$80,000. Find the total cost of all the monthly payments for each of the options listed below. Assume these are fixed-rate mortgages. Round the total cost of each mortgage to the nearest dollar.

Option 1: a 20-year mortgage with an APR of 8%      Option 2: a 15-year mortgage with an APR of 7%

- A. \$129,431; \$160,596  
B. \$160,596; \$131,481  
C. \$131,481; \$160,596  
 D. \$160,596; \$129,431
15. You invest your \$1500 tax refund into an account earning 5% compounded monthly. How much money will you have in 6 years?
- A. \$2010.14  
 B. \$2023.53  
C. \$9460.46  
D. \$1950.00
16. Your account has an APR of 10%, what is the APY with compounding 5 times a year?
- A. 10.41%  
B. 10.0%  
C. 50.0%  
D. 11.03%
17. You conduct a study and you want to demonstrate to others the relative proportions of the responses. The best type of display for this is to construct
- A. A histogram  
B. A bar chart  
C. A line diagram  
 D. A pie chart

**End of Multiple Choice Section. Check to make sure your Scantron:**

- has **17** answers bubbled in;
- has Test **Version A** both *written at the top* and *bubbled in below your CUID*;
- and shows your correct CUID both *written* and *bubbled in*.

**Free Response Section:** The following questions will be graded by hand. **Show all necessary work** and make sure that your answers are responsive to the question and are legible and complete. Verify that the answers carry the **appropriate units**. Unless otherwise directed, show your answers using two places past the decimal.

**Important: Only answers which are supported with appropriate work will be eligible for credit.**

1. A test has been created which will determine if a person carries the gene for Alzheimer's disease. This test is 95% effective, in that it detects 95% of the people who have the gene, and it is correct 95% of the time when it finds a person does not have the gene. Suppose it is believed that this gene occurs in 4% of the population, and that this test was given to 6000 people. Some of the results appear in the table below.

	People who do have the gene	People who do not have the gene	Totals
Test finds person does have the gene (positive result)	228	288	516
Test finds person does not have the gene (negative result)	12	5472	5484
Totals	240	5760	6000

- a. Fill in the empty cells of the table above so that a risk assessment can be performed.

$\frac{1}{2}$  point for each correct cell. In the calculations below, follow the student's work

- b. Given that a person receives a positive test result, what is the chance that he in fact does not have the gene for Alzheimer's disease? For credit, you must show your work.

$$\frac{288}{516} = .5581 \Rightarrow .5581 \times 100\% = 55.81\%$$

$\frac{1}{2}$  point

1 point each for correct numerator, denominator

Answer: 55.81%  
Round to the hundredths place

- c. Given that a person receives a negative test result, what is the chance that he in fact does have the gene for Alzheimer's disease? For credit, you must show your work.

$$\frac{12}{5484} = .0022 \Rightarrow .0022 \times 100\% = .22\%$$

$\frac{1}{2}$  point

1 point each for correct numerator, denominator

Answer: .22%  
Round to the hundredths place

2. Suppose you want to build a \$140,000 college fund in 19 years by making regular, monthly deposits into an account which pays a fixed rate of 6.5% APR.  
Do not round any values until the end, and show your answers to the hundredths place.
- a. How much would you have to deposit each month to reach your goal?

Correct formula	Formula with correct values
$A = \text{pmt} \frac{\left[ \left( 1 + \frac{\text{APR}}{n} \right)^{(ny)} - 1 \right]}{\frac{\text{APR}}{n}}$ <p>2 points for the correct formula -6 for incorrect formula</p>	$140,000 = \text{pmt} \frac{\left[ \left( 1 + \frac{.065}{12} \right)^{(12 \times 19)} - 1 \right]}{\frac{.065}{12}}$ <p>3 points for filling in parameters correctly -1 for each incorrect parameter Answer: \$ <u>312.47</u> 1 point (-.5 for incorrect rounding)</p>

- b. At the end of nineteen years, what percent of the \$140,000 results from interest alone ?

Total payments =  $\$312.47 \times 12 \times 19 = \$71,243.16$ ,  $\frac{1}{2}$  point  
so  $140,000 - 71,243.16 = 68,756.84 = \text{interest}$

$$\text{Percentage} = \frac{68,756.84}{140,000} = .4911 \times 100\% = 49.11\%$$

1 point

$\frac{1}{2}$  point  
Answer: 49.11% %  
Round to the hundredths place

3. The Pew Research Center asked 6000 registered voters in South Carolina if they intend to vote in the general election for John Brown. 2649 of these responded "yes." The margin of error was 2.5 percentage points.

Find the confidence interval likely to contain the true proportion that will vote for John Brown. Show your work and correctly round your answer to the hundredths place.

$$\frac{2649}{6000} = .4415 \quad 1 \text{ point}$$

$$.4415 - .025 = .4165 \quad \frac{1}{2} \text{ point}$$

1 point each

$$.4415 + .025 = .4665 \quad \frac{1}{2} \text{ point}$$

From 41.65 % to 46.65 %

4. You have a fixed-rate-30-year mortgage for \$135,000 at 7.5%. You are considering paying the loan off in 15 years instead of 30. Compare these two options.

<p>Show the correct formula to compute mortgage payments ⇒</p>	$PMT = \frac{P \times \left( \frac{APR}{n} \right)}{\left[ 1 - \left( 1 + \frac{APR}{n} \right)^{(-ny)} \right]}$ <p style="text-align: right; color: red;">2 points</p>
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<p>Payment required to pay the loan off in 30 years</p> $PMT = \frac{135,000 \times \left( \frac{.075}{12} \right)}{\left[ 1 - \left( 1 + \frac{.075}{12} \right)^{(-12 \times 30)} \right]}$ <p style="color: red;">1-½ points for correct use of parameters</p> <p>Payment = \$ <u>943.94</u> 1 pt</p>	<p>Payment required to pay the loan off in 15 years</p> $PMT = \frac{135,000 \times \left( \frac{.075}{12} \right)}{\left[ 1 - \left( 1 + \frac{.075}{12} \right)^{(-12 \times 15)} \right]}$ <p style="color: red;">1-½ points for correct use of parameters</p> <p>Payment = \$ <u>1251.47</u> 1 pt</p>
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Analysis	30-year plan	15-year plan
Total payments over the life of the loan	339,818.40	225,264.60
Total interest over the life of the loan	204,818.40	90,264.60
Savings with the 15-year plan ⇒		114,553.80

1 point each

5. You have a student loan for \$47,722 with a fixed APR of 10% for 12 years. The monthly payment for this loan is \$450.81.
- a. Complete the table below to calculate the portions of the payments that go to the principal and to interest during the first three months of the loan.

Month	Beginning Balance	Payment	Payment to Interest	Payment to Principal	Ending Balance
1	37,722.00	450.81	314.35	136.46	37,585.54
2	37,585.54	450.81	313.21	137.60	37,447.94
3	37,447.94	450.81	312.07	138.74	37,309.20

$\frac{1}{2}$  point each for filled in values. If student falters, follow him.

2007 Marginal Tax Rates: Standard Deductions and Exemptions				
Tax rate	Single	Married filing jointly	Married filing separately	Head of household
10%	Up to \$7000	Up to \$14,000	Up to \$7000	Up to \$10,000
15%	Up to \$28,400	Up to \$56,800	Up to \$28,400	Up to \$38,050
25%	Up to \$68,800	Up to \$114,650	Up to \$57,325	Up to \$98,250
28%	Up to \$143,500	Up to \$174,700	Up to \$87,350	Up to \$159,100
33%	Up to \$311,950	Up to \$311,950	Up to \$155,975	Up to \$311,950
35%	More than \$311,950	More than \$311,950	More than \$155,975	More than \$311,950
Exempt	\$3050	\$3050	\$3050	\$3050
Deduct	\$4750	\$9500	\$4750	\$7000

6. Sharon and Paul are married and have no children. Sharon has wages of \$63,000, interest income of \$1500, and contributed \$2000 to a tax-deferred retirement account. Paul has wages of \$59,000, interest income of \$1800, and also contributed \$4000 to a tax-deferred retirement account. They are entitled to one exemption per person named on the return, and will take the standard deduction. Determine their taxable income if they file using the status Married Filing Jointly.

	Work Space	Answer Values
Gross Income	63,000 + 1500 + 59,000 + 1800	125,300
Adjustments	2000 + 4000	6000
Adjusted Gross Income	125,300 - 6000	119,300
Deductions and Exemptions	3050 + 3050 + 9500	15,600
Taxable Income	119,300 - 15,600	103,700

1 point each. If student falters, follow him.

7. Over the last 35 years there have been 20 chairmen elected to the board of directors for the Acme Widget and Fireworks Company. The table below shows the number of the 20 chairmen who were the designated ages at the time of their election.

Age	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70
#	1	2	3	0	1	2	2	2	4	1	0	0	1	1	0

Carefully construct the information needed to prepare a pie chart for the data above. We want to compare the proportion of chairmen elected in each of the three age groups.

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Age Group	Frequency	Relative Frequency (to hundredths place)	# degrees in Pie (as a whole number)
56 - 60	7	.35	126
61 - 65	11	.55	198
66 - 70	2	.1	36

2 points for column    2 points for column

Draw and label the pie chart to indicate Age Group and Relative Frequency.

Proper division of Pie: 2 points

Labels:            Age Group label 1 point            Percentage label 1 point



