Formulas

Index number = \( \frac{\text{compared value}}{\text{reference value}} \times 100 \)

\[
\text{Price in } \$_y = (\text{price in } \$_x) \times \left( \frac{\text{CPI}_y}{\text{CPI}_x} \right) \quad \text{or} \quad \frac{\text{CPI}_y}{\text{CPI}_x} = \frac{\text{Price in } \$_y}{\text{Price in } \$_x}
\]

Rate of inflation = \( \frac{\text{CPI}_{\text{new}} - \text{CPI}_{\text{old}}}{\text{CPI}_{\text{old}}} \times 100\% \)


<table>
<thead>
<tr>
<th>Year</th>
<th>CPI</th>
<th>Year</th>
<th>CPI</th>
</tr>
</thead>
<tbody>
<tr>
<td>1990</td>
<td>130.7</td>
<td>1998</td>
<td>163.0</td>
</tr>
<tr>
<td>1991</td>
<td>136.2</td>
<td>1999</td>
<td>166.6</td>
</tr>
<tr>
<td>1992</td>
<td>140.3</td>
<td>2000</td>
<td>172.2</td>
</tr>
<tr>
<td>1993</td>
<td>144.5</td>
<td>2001</td>
<td>177.1</td>
</tr>
<tr>
<td>1994</td>
<td>148.2</td>
<td>2002</td>
<td>179.9</td>
</tr>
<tr>
<td>1995</td>
<td>152.4</td>
<td>2003</td>
<td>184.0</td>
</tr>
<tr>
<td>1996</td>
<td>156.9</td>
<td>2004</td>
<td>188.9</td>
</tr>
<tr>
<td>1997</td>
<td>160.5</td>
<td>2005</td>
<td>195.3</td>
</tr>
</tbody>
</table>
\[ A = P + (P \times APR \times Y) \]

\[ A = P \left(1 + \frac{APR}{n}\right)^{nY} \]

\[ A = Pe^{(APR \times Y)} \]

\[ P = \frac{A}{e^{(APR \times Y)}} \]

\[ APY = \text{Total Return} = \frac{A - P}{P} \times 100\% \]

\[ A = \text{PMT} \left[ \frac{\left(1 + \frac{APR}{n}\right)^{nY} - 1}{\left(\frac{APR}{n}\right)} \right] \]

\[ \text{Annual Return} = \left[ \left(\frac{A}{P}\right)^{\left(\frac{1}{Y}\right)} - 1 \right] \times 100\% \]

\[ \text{PMT} = \frac{A}{\left(1 + \frac{APR}{n}\right)^{nY} - 1} \]

\[ \text{PMT} = \frac{P}{\left(1 - \left(1 + \frac{APR}{n}\right)^{-nY}\right)} \]

\[ P = \frac{\text{PMT} \left[1 - \left(1 + \frac{APR}{n}\right)^{(-nY)}\right]}{\left(\frac{APR}{n}\right)} \]
Gross Income = Sum of All Income

Adjusted Gross Income = Gross Income – Adjustments to Income

Taxable Income = Adjusted Gross Income – (Deductions and Exemptions)

Total Income Tax = Tax Calculated from Table – Tax Credits

FICA Tax = 7.65% of Wages

Overall Federal Tax Rate = \( \frac{\text{Total Income Tax} + \text{FICA Tax}}{\text{Gross Income}} \times 100\% \)

### 2013 Marginal Tax Rates: Standard Deductions and Exemptions

<table>
<thead>
<tr>
<th>Tax rate</th>
<th>Single</th>
<th>Married filing jointly</th>
<th>Married filing separately</th>
<th>Head of household</th>
</tr>
</thead>
<tbody>
<tr>
<td>10%</td>
<td>Up to $8,925</td>
<td>Up to $17,850</td>
<td>Up to $8,925</td>
<td>Up to $12,750</td>
</tr>
<tr>
<td>15%</td>
<td>Up to $36,250</td>
<td>Up to $72,500</td>
<td>Up to $36,250</td>
<td>Up to $48,600</td>
</tr>
<tr>
<td>25%</td>
<td>Up to $87,850</td>
<td>Up to $146,400</td>
<td>Up to $73,200</td>
<td>Up to $125,450</td>
</tr>
<tr>
<td>28%</td>
<td>Up to $183,250</td>
<td>Up to $223,050</td>
<td>Up to $111,525</td>
<td>Up to $203,150</td>
</tr>
<tr>
<td>33%</td>
<td>Up to $398,350</td>
<td>Up to $398,350</td>
<td>Up to $199,175</td>
<td>Up to $398,350</td>
</tr>
</tbody>
</table>

Deduct $6,100 $12,200 $6,100 $8,950
Exempt $3,900 $3,900 $3,900 $3,900

Margin of Error Estimate = \( \frac{1}{\sqrt{n}} \times 100\% \)
BLANK so that you may tear off the formula sheets.

Feel free to use this as scratch paper.
Student’s Printed Name: _____________________  XID: C___________

Instructor: _________________________________ Section: _________

No questions will be answered during this exam.

If you consider a question to be ambiguous, state your assumptions in the margin and do the best you can to provide the correct answer.

You have 90 minutes (1.5 hours) to complete this test.

General Directions:

- Any communication with any person (other than the instructor or a designated proctor) during this exam of any form, including written, signed, verbal, or digital, is understood to be a violation of academic integrity.

- All devices, such as computers, cell phones, cameras, and PDAs, must be turned off while the student is in the testing room.

- You may use any scientific calculator except a TI-89 or a TI-NSpire CAS.

- No part of this test may be removed from the examination room.

On my honor, I have neither given nor received inappropriate or unauthorized information at any time before or during this test.

Student’s Signature:_______________________________

Do not write below this line.

<table>
<thead>
<tr>
<th>Question</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>Scantron</th>
</tr>
</thead>
<tbody>
<tr>
<td>Points</td>
<td>7</td>
<td>9</td>
<td>9</td>
<td>6</td>
<td>8</td>
<td>1</td>
</tr>
<tr>
<td>Earned</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Free Response Total | 40 |
Multiple Choice Total | 60 |

Test Score

Version A KEY – Page 5 of 19
Multiple Choice Portion

There are 20 multiple choice questions. Each question is worth 3 points and has one correct answer. Use a number 2 pencil and bubble in the letter of your response on the Scantron sheet. For your own record, also circle your choice on your test since the Scantron will not be returned to you. Only the responses recorded on your Scantron sheet will be graded.

1. The following histogram is constructed based on data measuring the distance (in light years) of 10 known stars relatively close to Earth.

![Histogram of Stars Distance](image)

Which of the following may be concluded from the histogram?

A) None of the stars under consideration are more than 10 light years from Earth.

B) Most of the stars under consideration are less than 7 light years from Earth.

C) Four of the stars under consideration are between 8 and 9 light years from Earth.

D) Two of the stars under consideration are less than 4 light years from Earth.

E) Five of the stars under consideration are between 6 and 9 light years from Earth.
2. Select the pie chart that best represents the data given in the table below.

<table>
<thead>
<tr>
<th>Favorite Beverage</th>
<th>Number of Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cola</td>
<td>170</td>
</tr>
<tr>
<td>Juice</td>
<td>105</td>
</tr>
<tr>
<td>Milk</td>
<td>115</td>
</tr>
<tr>
<td>Tea</td>
<td>155</td>
</tr>
<tr>
<td>Water</td>
<td>75</td>
</tr>
</tbody>
</table>

A) ![A diagram of pie chart]
B) ![B diagram of pie chart]
C) ![C diagram of pie chart]
D) ![D diagram of pie chart]
E) ![E diagram of pie chart]

3. Andrew had $39,000 in Taxable Income last year. His filing status is single and he itemizes his deductions. How much will his tax bill be reduced if he contributes $3,250 at a tax-deductible fundraiser?

A) $9,750.00
B) $812.50
C) $5,850.00
D) $3,250.00
E) $487.50
4. The scatter plot below shows the average outside temperature (over 30 days) and the amount of fuel used to heat a house. Which statement best describes the correlation?

![Outside Temperature vs Heating Fuel](image)

A) The diagram indicates no correlation.
B) There are too many outliers to determine correlation.
C) The diagram indicates negative correlation.
D) The diagram indicates both positive and negative correlation.
E) The diagram indicates positive correlation.

5. Suppose you deposit $300 into your savings plan at the end of every month. You savings plan pays you interest at an APR of 6% compounded monthly. What is your savings plan balance after 3 years? Round your answer to the nearest cent.

A) $9,861.30
B) $28,750.90
C) $359.00
D) $11,448.00
E) $11,800.83
6. A researcher wants to study the effectiveness of a new medicine. Sixty patients volunteered for the study. Thirty patients were given the new medicine and thirty patients continued to take their old medicine. The patients did not know which medicine was being administered, but the nurse interacting with the patients was aware of which medicine each patient was taking. What type of study is described here?

A) Experimental with no control group  
B) Observational  
C) Case-controlled  
D) Double-blind  
E) Experimental with control group

7. As voters in Tallytown exited polling locations they were asked if they voted for candidate Bob. There were 340 voters polled and 300 of those voters stated that they voted for Bob, 30 voted for a different candidate, and 10 chose not to answer. Identify the population parameter.

A) 300 voters  
B) 340 voters  
C) All voters in Tallytown  
D) The percentage of all voters in Tallytown in favor of candidate Bob  
E) 88.2% of voters

8. If it cost $20 to buy a meal for four in 2002, how much would it have cost to buy the same meal in 1992? Round your answer in the nearest whole dollar.

A) $18  
B) $22  
C) $16  
D) $24  
E) $26
9. Sue has a savings goal of $15,000 over a period of 12 years. She has access to a savings account with APR of 1.4% compounded monthly. How much should she deposit now in order to reach her goal? Round your answer to the nearest whole dollar.

A) $12,695
B) $15,000
C) $13,792
D) $12,682
E) $14,792

10. A car cost $2000 in the year 2000. What was its price in the year 2005 dollars? Round your answer to the nearest whole dollar.

A) $2268
B) $1770
C) $2260
D) $1763
E) $2023

11. You want to purchase a vehicle. You can afford to pay $350.00 per month. You want to have the vehicle loan repaid in 2 years. The interest rate your bank charges for a loan is 2.64% APR compounded monthly. What is the most you can afford to borrow to spend on a vehicle? Round your answer to the nearest dollar.

A) $7,955
B) $8,189
C) $8,173
D) $7,122
E) $8,177
12. All students whose Clemson University ID number ends with 6 were asked to fill out a form about the parking policy. This is an example of ...

A) Simple Random Sampling
B) Systematic Sampling
C) Stratified Sampling
D) Convenience Sampling
E) Group Sampling

13. You have purchased a new car for $25,300.00. The terms of your loan state that you will make 60 monthly payments at an interest rate of 3.0% APR compounded monthly. When calculating your monthly payment amount, what value do you enter into the formula for the variable \( Y \)?

A) .06
B) 12
C) 60
D) 5
E) 25300

14. Suppose you have the following three student loans.
   Loan 1: $10,000 with an APR of 8% compounded monthly for 15 years,
   Loan 2: $10,000 with an APR of 8% compounded monthly for 20 years, and
   Loan 3: $10,000 with an APR of 8% compounded monthly for 10 years.
   Rank the three loans from highest to lowest monthly payment.

A) Loan 1, Loan 3, Loan 2
B) Loan 3, Loan 1, Loan 2
C) Loan 3, Loan 2, Loan 1
D) Loan 1, Loan 2, Loan 3
E) Loan 2, Loan 1, Loan 3
15. Sam initially deposited $50 into an account with a simple interest rate of 2.0%. Calculate the amount of money in Sam's account at the end of 7 years. Round your answer to the nearest cent.

A) $42.57
B) $57.43
C) $57.00
D) $57.51
E) $120.00

16. What was the overall inflation rate from 1990 to 2000? Round your answer to the nearest hundredth of a percent.

A) 31.75%
B) 24.05%
C) 0.32%
D) 41.50%
E) 24.10%

17. A majority of the time Joey rides the subway, it breaks down. Which explanation is most logical?

A) Joey riding the subway causes it to break down.
B) Some unknown factor that causes Joey to ride the subway also causes the subway to break down.
C) It is just a coincidence that the subway breaks down when Joey is riding.
D) The breakdown of the subway causes Joey to want to ride it.
E) None of the above
18. John’s filing status is single. He earned wages of $49,982, received $1,608 in interest from a savings account, and contributed $4,028 to a tax-deferred retirement plan. John was entitled to a personal tax exemption of $3,650 and had deductions totaling $7,405. Find John’s taxable income.

A) $36,507  
B) $49,982  
C) $33,291  
D) $47,562  
E) $38,212

19. The average cost of a college education is projected to be $120,000 in 18 years. If new parents can get an APR of 3% compounded monthly, how much should they deposit monthly into a college fund (savings plan) for their baby? Round your answer to the nearest cent.

A) $719.67  
B) $67,976.93  
C) $555.56  
D) $419.67  
E) $855.56

20. Suppose you deposit $1000 into a savings account with an APR of 3% compounded continuously. Find the APY of this account.

A) 3.05%  
B) 3.00%  
C) 1.0305  
D) 1.6487  
E) 64.87%
Free Response Portion

Show all necessary work. Verify that the answers carry the appropriate units.

Partial credit may be given for work towards the correct solution. However, if answers are shown without necessary work, YOU MAY RECEIVE LITTLE OR NO CREDIT FOR THE CORRECT ANSWER.

1. Jenny inherits $10,000,000 from her late uncle, half of which she decided to donate to charity. She now has two options available to invest the remainder of her inheritance.

Option 1: Spend all of her remaining inheritance buying 1,000 shares of a company. After 5 years, her financial analyst predicts that she can sell all of her shares for $6,523,784.16.

Option 2: Put the remainder of her inheritance in a savings account earning 6.81% APR compounded annually.

a. Find the total return and the annual return if Jenny chooses Option 1. Round percentages to two decimal places.

Total Return: \( \frac{6,523,784.16 - 5,000,000}{5,000,000} \times 100\% = 30.48\% \)

Annual Return: \( \left( \frac{6,523,784.16}{5,000,000} \right)^{\frac{1}{5}} - 1 \times 100\% = 5.46\% \)

Total Return: ____ %
Annual Return: ____ %

b. Which option should Jenny choose? Circle one: Option 1 OR Option 2

1 point for correctly selecting Option 2, following work to give full credit for Option 1 if Annual Return in part (a) > 6.81%.
2. Suppose Jenny had student loans totaling $13,000 when she graduated from college. The interest rate is APR 7% compounded monthly and the loan term is 10 years.

a. What is her monthly payment? Round your answer to the nearest cent.

\[
PMT = \frac{13000 \left( \frac{.07}{12} \right)}{1 - \left( 1 + \frac{.07}{12} \right)^{-12 \times 10}} = $150.94
\]

Answer: $150.94

b. How much will she pay over the lifetime of the loan? Use your rounded answer from part (a) and round your answer to the nearest cent.

\[
Total\ Payments = \frac{$150.94}{\text{month}} \times 12\ \text{months} \times 10\ \text{years} = $18,112.80
\]

Answer: $18,112.80

c. Of the total amount paid, what percentage is paid toward the principal and what percentage is paid for interest? Round percentages to two decimal places.

\[
Interest\ Paid = $18,112.80 - $13,000 = $5,112.80
\]

Percentage toward principal = \(\frac{13,000}{18112.80} = 71.77\%\)

Percentage toward interest = \(\frac{5112.80}{18112.80} = 28.23\%\) (or \(100\% - 71.77\%\))

Percentage paid toward the principal: \(71.77\%\)

Percentage paid in interest: \(28.23\%\)
3. Charles is married and filing separately. His taxable income last year was $65,450. He received a tax credit of $1,000.

   a. Find Charles's Total Income Tax.

      Show ALL work and round your answer to the nearest cent.

      NOTE: You may find the following number line helpful in your calculations.

      Rates
      
      | 10% | 15% | 25% | 28% | 33% |
      |-----|-----|-----|-----|-----|
      | Married, $8,925 | $36,250 | $73,200 | $111,525 |
      | Filing sep. Cutoffs | $65,450 (Charles) |

      \[10\%(8925) + 15\%(36250 - 8925) + 25\%(65450 - 36250) = $12,291.25\]

      Apply tax credit: Total Income Tax = $12,291.25 – $1,000 = $11,291.25

      Total Income Tax: $11,291.25

   b. Charles's wages were $88,300 and he earned $4,578 from investments. Find Charles's FICA tax and overall federal tax rate.

      Show your work and round your answers to two decimal places.

      FICA = .0765 × $88,300 = $6,754.95

      Fed. Tax Rate = \[\frac{11291.25 + 6754.95}{88300 + 4578} \times 100\% = \frac{18046.20}{92878} \times 100\% = 19.43\%\]

      FICA Tax: $6,754.95

      Overall Federal Tax Rate: 19.43 %

      Points earned on this question: 3

      Available points on this question: 9
4. After the first debate, a survey was conducted of 3000 United States citizens. Of those surveyed, 2040 said they would vote for President Obama.

a. Find the margin of error. Round the percentage to one decimal place.

\[
\text{Margin of Error} = \frac{1}{\sqrt{3000}} \times 100\% \approx 1.8\%
\]

Margin of Error: \(1.8\) \%

2 points for MOE (1 pt formula and substitution, 1 point answer)

\(-1\) if 2040 used instead of sample size 3000

\(-\frac{1}{2}\) if answer not rounded correctly

b. Find the sample statistic and the 95% confidence interval for the percentage of voters who favor Obama. Round values to one decimal place.

\[
SS = \frac{2040}{3000} \times 100\% = 68\%
\]

\[
CI = [ (68 - 1.8)\%, (68 + 1.8)\% ]
\]

Sample Statistic: \(68\) \%

Confidence Interval: \([66.2\%, 69.8\%]\)

Points earned on this question: \\
Available points on this question: 6
5. The following table shows times at which a sample of 12 people woke up on a given morning.

<table>
<thead>
<tr>
<th>Wake Time Category</th>
<th>Number of People</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very Early (before 5:00 AM)</td>
<td>1</td>
</tr>
<tr>
<td>Early (5:00 – 5:59 AM)</td>
<td>3</td>
</tr>
<tr>
<td>Average (6:00 – 6:59 AM)</td>
<td>6</td>
</tr>
<tr>
<td>Late (7:00 AM or later)</td>
<td>2</td>
</tr>
</tbody>
</table>

a. Count the number of people in each category as indicated in the table below.

b. Construct a bar graph based on your work in part a.

1 point per correct bar height
No deduction if bars are not shaded
No deduction if compression is incorrectly indicated (Error circled on paper.)

-4 if no resemblance to correct bar graph
-½ if bars are the correct height, but first bar is touching vertical axis
-½ if bars are the correct height, but bars are touching each other
Scantron (1 pt.)

Check to make sure your Scantron form meets the following criteria. If any of the items are NOT satisfied when your Scantron is handed in and/or when your Scantron is processed one point will be subtracted from your test total.

My Scantron:

- is bubbled with firm marks so that the form can be machine read;
- is not damaged and has no stray marks (the form can be machine read);
- has 20 bubbled in answers;
- has MATH 1010 and my Section number written at the top;
- has my Instructor’s name written at the top;
- has Test No. 2 written at the top;
- has Test Version A both written at the top and bubbled in below my CUID;
- and shows my correct XID written in and then bubbled in with a zero in the first column followed by the eight digits.