Math 150 Final Exam Fall 2012

City College of New York

Answer 9 **complete** questions. Omit three complete questions.

Each question is worth 11 points. There is one free point on the exam.

1) Consider the following arguments. Draw a carefully labeled diagram for each one to test the validity of each argument. State whether the argument is valid or invalid.

a) Premises: **All horses are mammals. No mammal is a plant. All trees are plants**.
 Conclusion: **No horses are trees.** (6 pt.)

b) Premises: **All meat products contain protein. Chicken contains protein.**
 Conclusion: **Chicken is a meat product.** (5 pt.

2) a) You decide to take a 1,264-mile cross-country trip to Cooper City, Florida. Suppose your car averages 30 miles per gallon during the trip and that the cost of gasoline is $3.89 per gallon. How much will you spend on gasoline during the trip? Round your answer to the nearest dollar. (5 pt.)

b) The Smith family’s living room lighting uses a total of 180 watts of power. The family uses the lighting in that room for 22 hours a week. How many kilowatt-hours of energy does the lighting use in one year? (6 pt.)

3) The base elevation of a mountain is 1,600 feet. A hiker gains elevation at a constant rate of 700 vertical feet per hour.
a) Write an equation that relates the elevation (E), in feet, of the climber to the time (t), in hours, since the hiker began climbing. (3pt.)

b) What will the hiker's elevation be after 2.5 hours? (4 pt.)

c) The summit of the mountain is 4,400 feet. How long will it take the hiker to reach the summit?. (4 pt.)

4) Use the Venn diagram below to answer questions about people in an office building:



a) How many coffee drinkers are there in the office building? (3 pt.)

b) How many in the office building are over 35 years old? (3 pt.)

c) How many in the office building are over 35 years old but don't drink coffee? (3 pt.)

d) How many total people are there in the office building? (2 pt.)

5) a) You purchase a television with a retail price of $700. The local sales tax rate is 7.9%. What is the final cost? (6 pt.)

b) The final cost, including tax, of your new shoes is $90. The local sales tax rate is 7.9%. What was the retail (pre-tax) price? Round to the nearest cent. (5 pt.)

6) With a reference value of 1982, the CPI in 1992 was 140.3 and the CPI in 2007 was 207.3. Use this information to answer the following questions:

a) If Bob made $36,000 a year in 1992, what salary did he need to make in 2007, to the nearest dollar, to maintain the same standard of living? (6 pt.)

b) If a new car cost $20,000 in 2007, use the CPI for both years to estimate its cost, to the nearest dollar in 1992. (5 pt.)

7) Identify at least one potential source of bias in each of the following studies. Explain your answers clearly.

a) To predict who will win a senate race, a newspaper randomly selects people at an airport and asks who they will be voting for in the upcoming election. (6 pt.)

b) A casino conducts a study to determine whether the public supports legalizing gambling. (5 pt.)

8) a) In July of 1999, Denver's population was 499,775 and its yearly growth rate was approximately 11%. If the growth rate had stayed constant, what would the estimate of the population have been in 2009? Its population in July of 2009 was 610,345, so what can we conclude about its growth rate in the years following 1999? (6 pt.)

b)If the price of platinum decreases at a monthly rate of 2%, by what percentage does it decrease in a year? Write your answer so that it's correct to 2 decimal places. (5 pt.)

9) A survey at a movie theatre asks what movie viewers just watched. The results are given in the frequency table below:

|  |  |
| --- | --- |
| Movie | Number of viewers |
| Breaking Dawn | 30 |
| Skyfall | 25 |
| Lincoln | 17 |
| Life of Pi | 15 |

a) Complete the frequency table by making columns for relative frequency and cumulative frequency. (7 pt.)

b) Draw a bar graph with the movies as categories and the vertical axis showing the relative frequencies as calculated in your table. Label the graph appropriately and completely. (4 pt.)

10) a) How much would it cost to carpet a 12 foot by 14 foot room with carpeting that costs $35 per square yard? Round your answer to the nearest dollar. (6 pt.)

b) Suppose 1.5 million cubic kilometers of water are spread out over Earth's 340 million square kilometers of ocean surface. How much would the sea level rise? (5 pt.)

12) The scores of thirteen students on a chemistry exam are given below:

78 61 86 12 75 80 68 72 71 82 100 62 70

a) Find the five number summary of the grades and show a box-plot of the data. (7 pt.)

b) The teacher decides that the lowest and highest score are outliers. What are the mean and median if the outliers are removed? (4 pt.)

11) The population of certain mammal species is counted in a protected wildlife area. The graph below shows the population counts over the course of three weeks in the summer.



a) Which population rose the most over the course of the three weeks? Estimate the relative change in population from week 1 to week 3 for that species. Show the numbers you use in your calculations. (5 pt.)

b) Which population had the greatest decline in *relative* change from week 1 to week 3? Show which estimates and calculations you use to determine this. (6 pt.)

12) The label on Crunchy Pops cereal boxes claims that the box contains 10 ounces. The actual weight of the cereal in the boxes is normally distributed with a mean of 10 ounces and a standard deviation of 0.45 ounces.
a) What percent of the boxes contain more than 9.5 ounces?
b) What percent of the boxes contain between 9.55 and 10.9 ounces?
c) In a carton of 600 boxes, how many of the boxes would you expect to contain less than 10.09 ounces?

Standard scores and percentiles for normal distributions

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FORMULAS

Exponential Growth Exponential Decay

 P < 15  P < 15

 
 r > 0  r < 0

Standard Normal (z score) 