

M1030 Math 1030 Departmental Final Examination Fall 2008

Name: _____

Instructor's Name: _____ Section: _____

Instructions: Please note that there are two parts. Part I is worth a total of 30 points. Part II is worth 70 points. Show your work on each question.

The formulas below are provided for your convenience

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

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

Final Examination Score : _____

Part I: (30 pts) There are five questions and each question is worth 6 points.

1. You plan to travel to Europe. You will take a 1,106 kilometers trip from Rome to Paris and you find out that the cost of gas is \$5.64 per gallon. The car that you would like to rent is fuel efficient and uses 1 liter of gas for every 22 kilometers that you drive. How much (in \$) will you spend on gas on this trip? (1 liter is 0.2642 gallons)

Answer _____

2. If you deposit \$6,000 now and you can get an APR of 2.15 % compounded continuously, how much will you have in 17 years?

Answer _____

3. Your car is worth \$24,000. If the value of your car is depreciating at a rate of 15% per year, how much will your car be worth 15 years later?

Answer _____

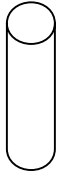
Does this situation represent a linear or exponential model? Why?

4. Consider the statement: "The smoking rate among twelfth-graders jumped 20 percent, to 22 percent." What percentage of twelfth graders smoked before the increase?

Answer _____

5. The shape below with the given dimensions is a scale model of a cylinder. The cylinder will be scaled down so that the new cylinder will have a height of 2 inches. Find the surface area and the volume of the new cylinder?

Model



height = 15 in

surface area = 406.84 in^2

volume = 577.27 in^3

New cylinder:

Surface area of cylinder _____

Volume of cylinder _____

Part II (70 pts): There are 7 questions and each question is worth 10 points.

1. One morning, there were 4 inches of snow on the ground. Then the winter storm started and snow started accumulating at a constant rate of 3 inches every 2 hours.

a) Identify the independent and dependent variables:

independent variable _____ dependent variable _____

b) Write a linear equation that describes this situation.

Answer _____

c) How long did it take for the height of the snow to reach 14 inches?

Answer _____

2. An empty water tank is in the shape of a sphere with a radius of 24 meters. Water flows into the tank at a rate of 18 cubic yards per second. How many minutes will it take until the tank is full? 1 meter = 1.094 yards

Answer _____

3. A community of rabbits has a doubling time of 3 months.
- a) How long will it take for this rabbit population to triple in size?

Answer _____

- b) If there are initially 50 rabbits, what will the population be 2 years later?

Answer _____

4. A savings account pays an annual percentage rate of 2.75% compounded quarterly.
- a) Find the annual percentage yield on this account.

Answer _____

- b) You decide that you would like to make regular quarterly deposits to this account since you would like to have \$450,000 when you retire in 40 years. How much should your quarterly deposits be in order to accomplish your goal?

Answer _____

5. A certain medication breaks down in the human body (decreases) at a rate of 12% per hour.

a) Find the approximate half-life.

Answer _____

b) Find the exact half-life of that medication in your bloodstream.

Answer _____

c) If you took 500 mg of this medication at 2 pm, how much is left in your bloodstream at 9 pm?

Answer _____

6. There are 85 cars on a used car lot. Out of those 85 cars, 24 are Ford and 31 are Dodge, and 25 are red cars. There are 8 red Ford, and 10 red Dodge cars.

a) Draw a Venn diagram to illustrate this information. Use the symbols F, D, R to represent the set of Ford, Dodge, and red cars respectively.

b) Use your diagram to answer the following:

How many cars (on this lot) are red, but are not Ford and not Dodge. Answer _____

How many cars (on this lot) are not red, not Ford, and not Dodge. Answer _____

7. You have found that you are eligible for a 30 year house loan with an annual interest rate (APR) of 6.25%, compounded monthly.

a) If you take out this loan for \$250,000, what will your monthly payment be?

Answer _____

b) How much will you pay in interest (in \$ terms) over the life of the loan if you take out this loan for \$250,000?

Answer _____

c) If you decide instead to get a 20-year loan at the same rate for the same amount, what would your monthly payment be and how much would you save (in dollars) in interest (if you decided to take a 20 year loan instead of 30 year loan)?

Monthly payment _____

Interest saved _____