M1030 Math 1030 Departmental Final Examination Fall 2006

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

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

Part I Total : _____

Part II Total : _____

Final Examination Score : _____

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

1. If property taxes increase 12% in one year and then decrease 5% in the next year, by what percentage did the property tax change over the two-year period?

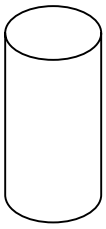
Answer _____

2. The percentage of all bachelor's degrees awarded to men dropped from 56% in 1972 to 42% in 2000. Find the relative change.

Answer _____

3. The shape below with the given dimensions is a scale model for a cylinder. The model will be scaled up so that the cylinder will have a radius of 16 inches. What will the surface area and the volume of the cylinder be? (Please include units.)

Model



radius = 3 in
surface area = 245 in^2
volume = 282.74 in^3

Surface area _____

Volume _____

4. You travel to Italy where the cost of a certain kind of cheese is 7.2 euros per kilogram. Find the cost in dollars per pound. (1 kilogram is 2.2 pounds, 1 euro is 1.32 dollars)

Answer _____

5. The value of your house is increasing at an average rate of 7.5% per year.

a) If your house is worth $ 210,000 now, how much will it be worth in 25 years?

Answer _____

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

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

1. You take 500 mg of a certain medication at 2 pm. A lab test done at 7 pm shows that you still have 300 mg of that medication left in your bloodstream.
(Please include units in your answer.)

a) What is the rate of decrease of that medication in your bloodstream?

Answer _____

b) What is the exact half-life of that medication in your bloodstream?

Answer _____

2. The following data represents measurement of the concentration of a substance in a patient's bloodstream, after the starts of a treatment meant to boost the concentration:

Days after start of treatment	3	5	8	15
Concentration in ppm	2.6	3.2	4.1	6.2

a) Create a linear equation that would represent this situation.

Answer _____

b) How long will it take for the concentration to reach 20 ppm?

Answer _____

3. A savings account pays an annual percentage rate (APR) of 3.5% compounded quarterly.

a) Find the annual percentage yield (APY) on this account.

Answer _____

b) You decide that you would like to make a regular quarterly deposits to this account since you would like to have $500,000 when you retire in 35 years. How much should your quarterly deposits be in order to accomplish your goal?

Answer _____

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

a) If you take out this loan for $220,000, 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 $220,000?

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 _____

5. An empty water tank is in the shape of a right cylinder with a diameter of 30 yards and a height of 25 yards. Water flows into the tank at a rate of 13 cubic feet per second. How many minutes will it take until the talk is full?

Answer _____

6. Mice population in a particular forest grows at a rate of 2.5% per month.

a) How long will it take for this mice population to triple in size?

Answer _____

b) If the initial mice population was 50, find the population after 4 years.

Answer _____

7. Of the 60 student in the Pre-Law Club, 26 are taking a philosophy class, 23 are taking a sociology class and 28 are taking a history class. 5 students are taking just sociology. Moreover, 10 students are taking philosophy and history class only, 8 students are taking history and sociology only, and 7 are taking philosophy and sociology only.

a) Draw a Venn diagram to illustrate this information. Use the symbols P. S, H to represent the set of students taking philosophy, sociology, and history respectively.

b) Use your diagram to answer the following:

How many students are taking all three subjects? Answer _____

How many students in the Pre-Law Club are not taking any of these three subjects?

Answer _____