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

Start Time: ______
Finish Time: ______
Elapsed Time: ______

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Cheat Sheet of Formulae

Savings Plan Formula

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

Installment Loan Formula

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

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Part I Total: ______
Part II Total: ______
Total Score: ______
Part I There are seven questions.

Start Time: 

1. (5 points) Salsa Cycles reduced the price of their sexy Bandidto mtb frame from $703 to $664. By what percentage did the price change?

2. (5 points) Solve for $t$ in the following:

$$\frac{6t}{5t - 8} = 4$$

3. (5 points) You are on a skydiving trip. While you are in the plane you decide to calculate how fast you will be falling 10 seconds after you jump. Someone tells you that you will be falling 980m/s. How fast is that in mph (mi/hr)?
4. (5 points) I want to make a Math 1030-006 T-shirt. The logo is 10 cm long and 3 cm tall. To go on the shirt I want it to be 25 cm long. What will the area of the logo be if I blow the image up to this size? What if I make it 5 cm tall?

5. (5 points) You buy a PowerMac G5 for $1499. Computers lose 3% of their value every month. How much is your computer worth in 3 years?

6. (5 points) At Gringott’s they offer a savings account with an apr of 2% compounded continuously. If I put 20,000 gold pieces in a savings account how much will you have in 13 years?
Part II (70 pts): There are 7 questions and each is worth 10 pts.

7. (10 points) So you’ve decided to take a bath (Congratulations). There is already 2 inches of water in the tub and your faucet can fill the tub at a rate of 1 inch every 40 seconds.
   a. (3 pts) Identify the independent and dependent variables:

   b. (4 pts) Write a linear equation that describes this situation.

   c. (3 pts) How long does it take to fill tub to 12 inches deep?

8. (10 points) There are 100 bikes in the bike shop. There are 12 Klein, 40 Raleigh, and 52 that are full suspension. There are 10 full suspension Klein and 22 full suspension Raleigh.
   a. (5 pts) Draw a Venn diagram to illustrate this information. Use the symbols K, R and FS to represent the set of Klein, Raleigh and full suspension respectively.

   b. (5 pts) Use your diagram to answer the following:
   How many bikes in the shop are full suspension but not Klein or Raleigh?

   How many bikes in the shop are not full suspension, not klein and not Raleigh?
9. (10 points) A commune of liberally minded chickens grows at a rate of 7% per month.
   a. (3 pts) Estimate the doubling time.
   b. (4 pts) Find the exact doubling time?
   c. (3 pts) How long will it take the commune to pentuple its population?
10. (10 points) You have qualified for a 15 year mortgage at an APR of 4.25% on $165,000.
   a. (4 pts) What will your monthly payment be?

   b. (3 pts) How much will you pay in interest over the life of the loan?

   c. (3 pts) If you decide to do a 30 year mortgage, at the same rate, instead what would
   your payments be? How much more interest would you spend over the life of the loan?
11. (10 points) An unnamed person takes 50 mg of Viagra at 9 pm. A lab test at 3 am shows that this person has 35 mg left in their blood.

a. (5 pts) What is the rate of decrease of that medication in their bloodstream?

b. (5 pts) What is the exact half-life of the Viagra?
12. \(10\) points\) A savings plan pays an APR of 1.75\% compounded quarterly.
   a. \(5\) pts\) Find the APY on this account.

   b. \(5\) pts\) You want to have $400,000 in 25 for your early retirement. What size should your quarterly payments be to accomplish this goal?
13. *(10 points)* An empty water tank is in the shape of a right circular cylinder with a radius of 10 m and a height of 30 m. Water flows into the tank at a rate of 5 cubic feet per minute. How long until the tank is half full of water?