MAT 105 Exam 1 (ivory) Spring 2009   Name _____

Problems	1	2	3	4	5	Total		Grade
Points							%	
Out of	12	32	32	14	10	100		

Relax. You have done problems like these before. Even if these problems look a bit different, just do what you can. If you're not sure of something, please ask! You may use your calculator. Please show all of your work and write down as many steps as you can. Don't spend too much time on any one problem. Always remember to report the units on an answer. Do well. And remember, ask me if you're not sure about something.

*A few formulas from our book:*

Root Formula:
A solution of the equation $B^n = k$ is $B = k^{1/n}$.

Percent Increase Formula:
To get the result of increasing an amount by $r\%$, multiply by $1 + \frac{r}{100}$.

1. Khalid is concerned about the environment and hence is investigating the emissions of a local garbage incinerator. The graph below shows the amount of sulfur dioxide (S, units of grams per cubic meter) in the air a distance D (in miles) from the plant. Large amounts of sulfur dioxide in the air cause a phenomena known as acid rain. Use the graph to answer the following questions.
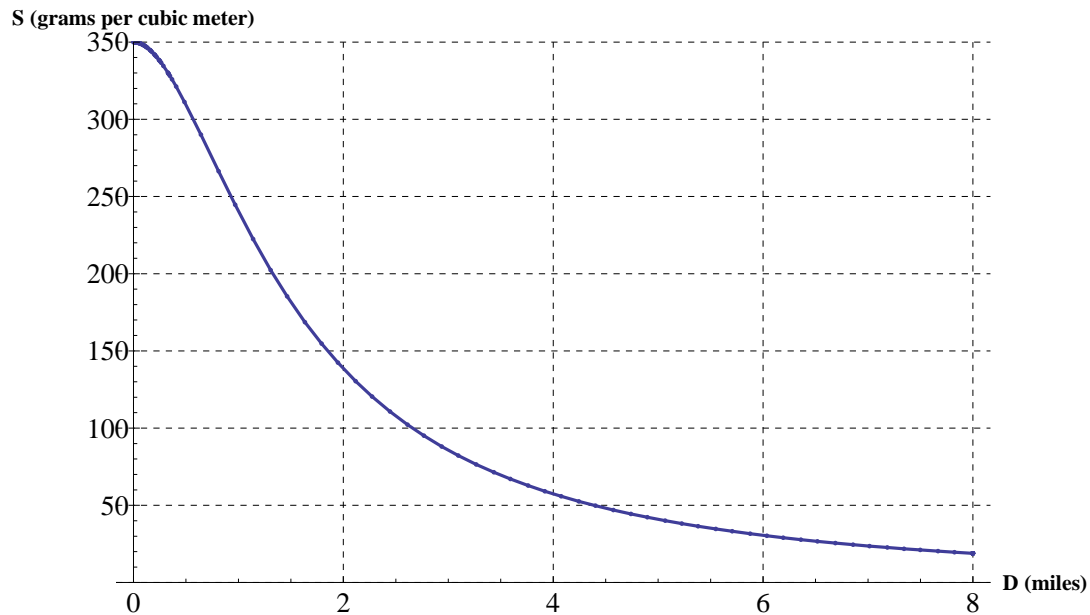
(a) How much sulfur dioxide is in the air at the incinerator?

(b) What is the sulfur dioxide concentration 3 miles from the incinerator?

(c) How far away from the incinerator is the sulfur dioxide concentration at 150 grams per cubic meter?

(d) About how far away from the plant is the sulfur dioxide concentration below 50 grams per cubic meter?

2. To ship a package to my sister in Denver there is a flat rate of $3.00 with a cost of $0.15 for every ounce.

    (a) Make a table showing the cost to ship the package if it weighs 5 ounces, 10 ounces, and 20 ounces.

    (b) Name the variables, including units, and write an equation illustrating the dependence.

    (c) The postal worker told me it would cost $5.70 to ship the package. Solve your equation to determine how much the package weighs. *If you cannot solve the equation, you may show some other method of finding the answer for possible partial credit.*

    (d) Draw a graph showing how the cost of the package changes with its weight.
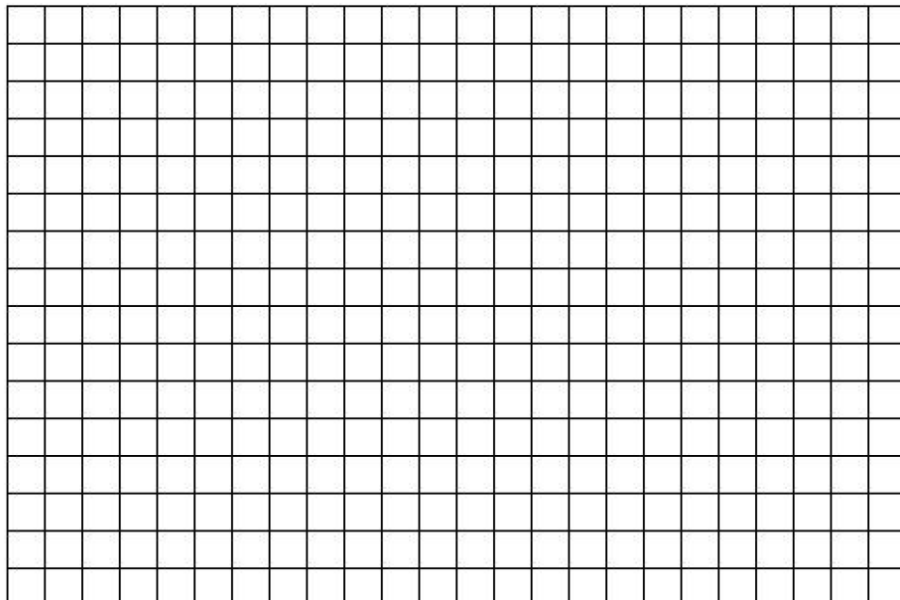
3. The CIA world factbook estimated that the population of Venezuela is growing at a rate of 1.5% per year. In 2008 the population was estimated to be 26 million.
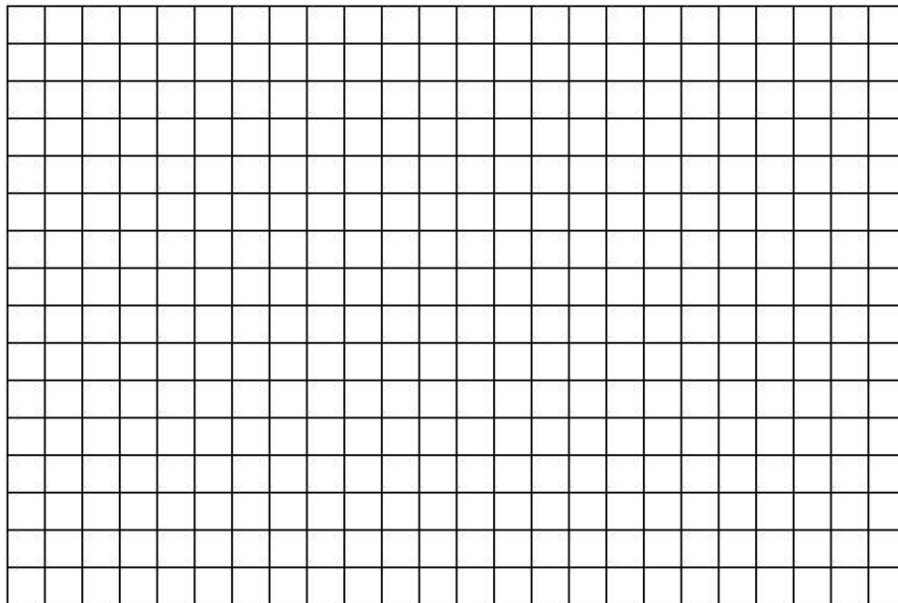
(a) Write an equation illustrating this dependence using the following variables:

P = population (measured in millions of people)

Y = year (measured in years since 2008)

(b) Make a table showing the population in 2008, 2013, 2018, and 2023. Please report your answer to the first decimal place.

(c) Draw a graph showing how population will change in the future.

(d) Use successive approximations to predict when the population will rise above 31 million. Please report your answer to the first decimal place. *Display your work in a table. Answer to the nearest year. Be sure to say the actual year.*

4. When you apply the brakes to stop a bicycle, you don't actually stop immediately. The distance it takes depends on how fast you were going. For one bike tested, $D = 0.41S^2$, where S is the speed of the bike (in mph) and D is the distance before stopping (in feet).

   (a) Make a table showing the shopping distances for speeds of 5, 10, 15, and 20 mph. Please report your answer to the first decimal place.

   (b) Approximately how fast can a bike go and still be able to stop within 30 feet? Please report your answer to the first decimal place.

   You may use whatever method you prefer to answer the question, but please give an answer accurate to one decimal place.

5. In Germany, gasoline prices are recorded in Euros/liter. (The Euro is the currency of the European Union). The average price of gasoline in Germany is 1.17 Euros/liter. What would that price be in terms of US dollars per gallon?

   Useful facts: $1.00 ≈ 0.77 Euros and 1 gallon ≈ 3.8 liters