MAT 105 Exam 2 (ivory) Spring 2009 Name _____

Problems	1	2	3	4	5	Total		Grade
Points							%	
Out of	14	26	24	16	20	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. Do well. And remember, ask me if you're not sure about something. ***Be sure to report the correct units on each answer.***

---

1. My desktop computer cost me \$999. The computer came with 640 gigabytes of memory. The cost per each additional gigabyte is \$1.50.

   (a) Assuming each gigabyte costs \$1.50, what is the base price of the computer alone?

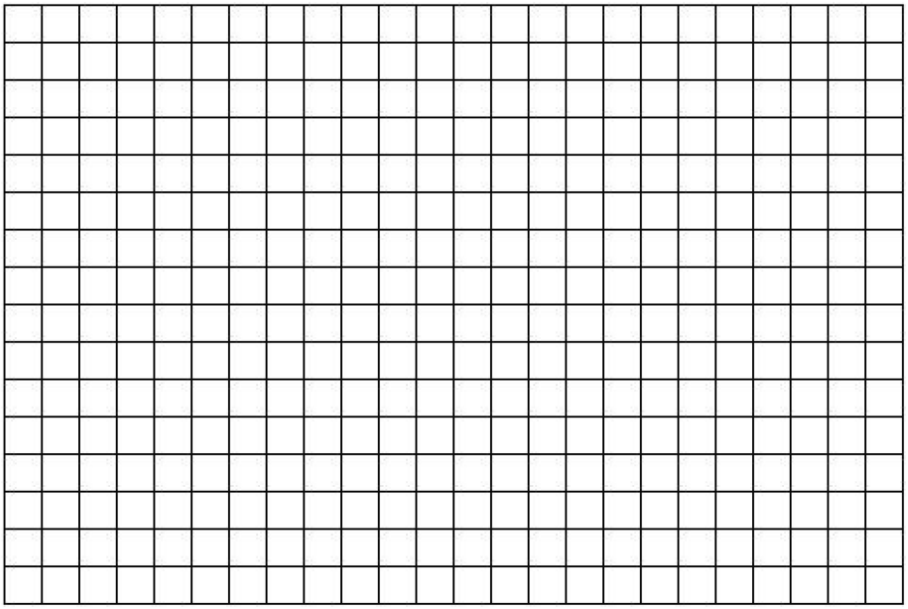
   (b) Name the variables, including units, and write an equation relating them.

2. The more coffee I drink, the fewer hours of sleep I get from too much caffeine. For every cup of coffee I drink I sleep a half hour less. The total hours of sleep S I get depends on the total cups of coffee C according to the equation:

$$S = 9 - 0.5C$$

(a) Make a table of values showing the hours of sleep I get if I drink 1, 4, or 8 cups of coffee.

(b) Draw a graph illustrating the dependence.



(c) If I drink 3 cups of coffee, approximately how many hours will I sleep?
Say what the answer is and mark the point on your graph that shows the answer.

(d) If I want to sleep 6 or more hours each night, how many cups of coffee should I limit myself to? In other words, solve the inequality $9 - 0.5C \geq 6$.

3. We are looking into purchasing a new car. We have narrowed it down between two models: the Chevy Malibu, priced at \$22,300, and the Honda Civic Hybrid, priced at \$24,300. Annual fuel costs (at current gas prices) for the Chevy Malibu are \$1100. For the Honda Civic, annual fuel costs are \$590. If we let Y represent the number of years we own the car and C the total cost of the car (in thousands of dollars \$), then the equations are:

$$\text{Chevy Malibu: } C = 22.3 + 1.1Y$$

$$\text{Honda Civic: } C = 24.3 + 0.59Y$$

(a) Complete the table comparing the total cost for each car for 1, 3, 5, and 10 years after purchasing it.

Years	1	3	5	10
Malibu				
Civic				

(b) Set up and solve a system of linear equations to determine the **payoff time**, or the number of years for which the total costs of each car are equal.

If you cannot solve the system symbolically, you may find the answer another way for a little partial credit.

(c) Based on what you've learned, **fill in the blank and circle the correct word.**

The more expensive Honda Civic pays off in we're going to use it for ____or [more/fewer] years.

4. In 1960 the population of a town was 18,310 people and increasing. In 1980, the town's population was 19,740 people.

   (a) By how much has the population increased each year, on average? *Note: in this context the phrase "on average" means that you should assume the increase is* ***linear****.*

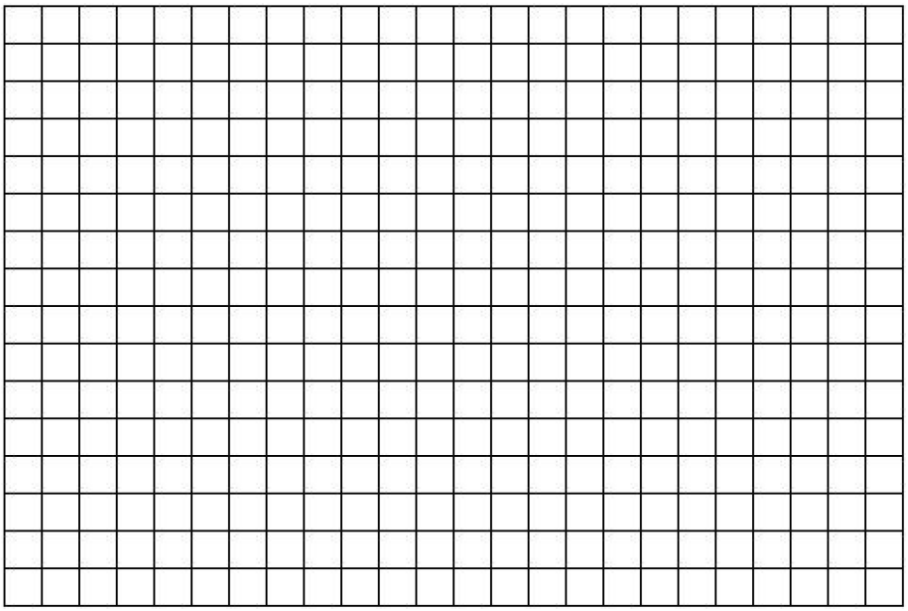
   (b) Name the variables, including units, and write a linear equation relating them. *Hint: measure the years since 1960.*

   (c) According to your equation, at this rate when will the population be over 20,000 people?

5. My mechanic tells me that frequent oil changes reduce the amount of maintenance on my car. To prove his point, he showed me a table of customers with the number of yearly oil changes and the cost of their engine repairs.

Oil Changes per year	1	2	3	4	5	6	7
Cost of repairs ($)	725	500	415	300	275	100	150

(a) Make a large scatter plot of the points.



(b) Draw in a line that fits the data reasonably well.

(c) According to your line, how many oil changes a year do I need in order to have engine repairs as close to zero as possible?