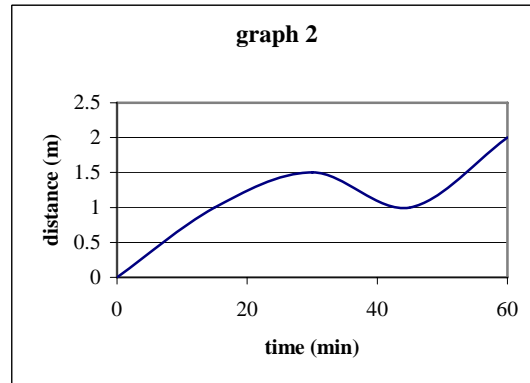
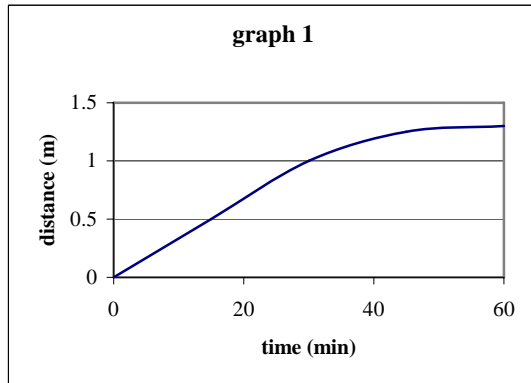


First Midterm Exam Math 1330 Section 15 September 13, 2006

Relax, relax, **RELAX**, relax, *relax*...

Please show all of your work so you can receive partial credit.

1. The two graphs given here show the relationship between time elapsed in minutes and the distance from the starting point for an elderly gentleman.



- Write a possible verbal description of a trip that would explain each graph.
- For which graphs is distance a function of time? (why?)
- For which graphs is time a function of distance? (why?)

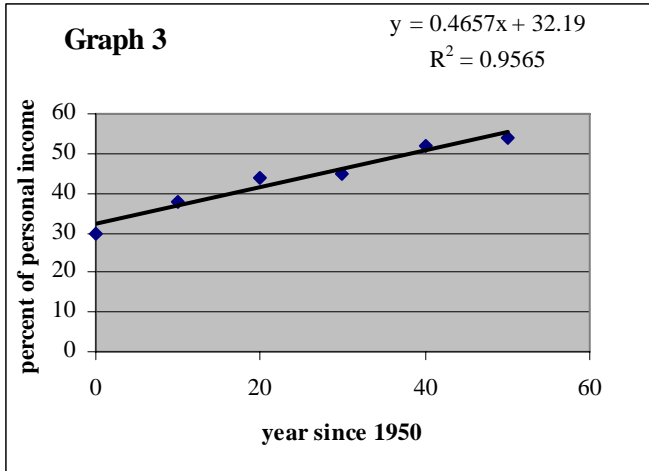
2. You help run a local coffeehouse, and have had the same musical group perform three years in a row. You have modeled the relationship between the selling price  $p$  and the number of tickets sold  $q$ . Here is the linear model you found:  $q = -20p + 250$  for  $p$  from \$5 to \$12. You will pay the band \$500. You believe you will make an additional \$1.50 per person for food and drinks sold at the intermission.

Using all of this information, fully define a model for the profit in terms of the price  $p$ .

3. The taxable income as a percentage of personal income for the US from 1950-2000 is shown in this table: (Note I have changed the data from the book so these values are fictitious.)

Year	1950	1960	1970	1980	1990	2000
Percentage	30	38	44	45	52	54

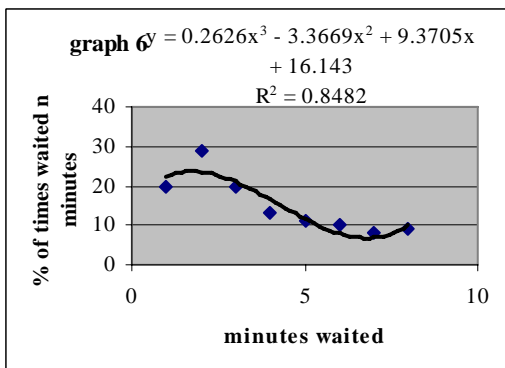
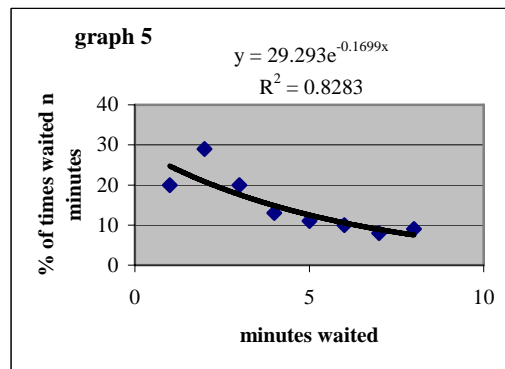
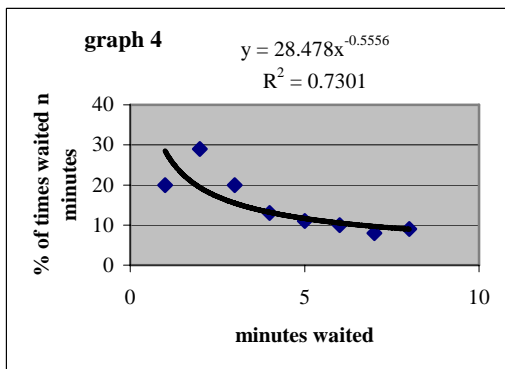
We define a variable  $t$  to be the years since 1950. Here is a linear fit done in Excel:



- (a.) Is this model a good fit to this data? Why or why not?  
 (b.) What does the model predict the percentage will be in 2010? In 2050?  
 (c.) Interpret what the slope of this line means.

4. Mr. Ay spend a lot of time waiting for the trolley. To help pass the time, Mr. Ay has kept a record each day last year of how many minutes he waited for the trolley. After 100 days, he converted his data to percentages and found this:

Number of minutes waited	0	1	2	3	4	5	6	7
Percent of time he waited n minutes	20	29	20	13	11	10	8	9



Here are graphs with three models.

- (a.) Identify the model that belongs to each graph (from this list: cubic, exponential, linear, logarithmic, logistic, power, quadratic.)  
(b.) Which do you think is the best model, and why?

5. A student likes to take power naps and is interested in the effect that naps have on her energy level. Here are results from the student's study:

Nap (minutes)	5	10	15	20	25	30	35
energy	30	45	60	45	35	40	25

Calculate the following on the interval from 15 to 35 minutes:

- (a.) actual change in energy level on this interval  
(b.) percent change in energy level on this interval  
(c.) rate of change in energy level on this interval  
(d.) percent rate of change in energy level on this interval