Focus on Modeling:
Fitting Formulas to Data

1. True/False: If the answer is false, correct it without using the word not.

   a. $P(t) = 200e^{.061t}$ has an annual growth rate of 6.1%.

   T **F**

   b. The doubling time for \$500 at 8% compounded continuously is about 8.7 years.

   T **F**

   c. Given the cost function $C(q) = 100q + 2400$, the marginal cost is \$2400.

   T **F**

2. The table below shows the number of Japanese cars imported into the U.S. from 1964 to 1971.

Year	1964	1965	1966	1967	1968	1969	1970	1971
Cars (thousands)	16	24	56	70	170	260	381	704

   (a) On your calculator plot the number of Japanese cars imported into the U.S. against the number of years since 1964.

   (b) Does the data look more linear or exponential? Fit a linear or an exponential regression function to the data (whichever you feel is more appropriate), and graph it with the data.

   (c) What annual average/percentage increase in Japanese imports does your model show? (Specify whether it's an average or a percentage increase.)

   (d) Do you expect this model to give accurate predictions beyond 1971? Explain.

3. For each of the tables of data that follow:

   (a) Use a plot of the data to decide whether a linear, exponential, logarithmic, or quadratic model fits the data best.

   (b) Use your calculator to find the regression equation for the model you chose in part (a). If the equation is linear or exponential, interpret the absolute or relative rate of change.

   (c) Use the regression equation to predict the value of the function in the year 2005.

   (d) Plot the regression equation on the same axes as the data, and comment on the fit.

World solar power, S, in megawatts; t in years since 1990

t	0	1	2	3	4	5	6	7	8	9	10
S	46	55	58	60	69	79	89	126	153	201	288

Carbon dioxide, C, in ppm; t in years since 1960

t	0	5	10	15	20	25	30
C	325.5	331.0	338.5	345.7	354.0	360.9	369.4