

## EXPONENTIAL and LOGARITHMIC MODELS

### ***PROBLEM 3: INVESTING MONEY***

Suppose that you are 18 years old and have \$1000 to invest. Explore the following numerically, graphically, and algebraically.

- A. Determine the value of the investment when you are 60 if you invest the money at 3%, 6%, 10%, and 15%, assuming interest that is compounded annually.
- B. Determine the value of the investment when you are 60 if you invest the money at 3%, 6%, 10%, and 15%, assuming interest that is compounded quarterly.
- C. Determine the value of the investment when you are 60 if you invest the money at 3%, 6%, 10%, and 15%, assuming interest that is compounded monthly.

### ***EXTENSIONS***

1. What does continuous compounding mean? Determine the value of the investment if interest is compounded continuously.
2. Answer the questions above if you add \$1000 to your investment every year.
3. Ask people and investigate the reasons for investing at different rates? Why do people invest money at 3% when higher interest rates are available? Are there compromises that must be made?

### ***PROBLEM 4: EARTHQUAKES AND THE RICHTER SCALE***

Two of the most significant earthquakes in the Western Hemisphere in recent years were the 1989 earthquake in the San Francisco area, the one which disrupted the World Series among other things, and the 1985 earthquake in Mexico City, which left thousands of people homeless. The Richter Scale is a logarithmic scale used to measure the magnitude of earthquakes. The Richter Number,  $R$ , is defined as  $R = \log\left(\frac{I}{I_0}\right)$ , where  $I_0$  is a standard value used for comparison purposes and  $I$  is the intensity of the quake. The two earthquakes mentioned above measured 7.1 and 8.1, respectively, on the Richter Scale. Compare their intensities.