1.8 Polynomials with a Calculator Name: ________________________

In Exercises 2-7, find relative maxima, relative minima, and the intervals on which each function is increasing and decreasing.

2. $f(x) = x(x-3)$

3. $f(x) = x(x-2)(x+3)$

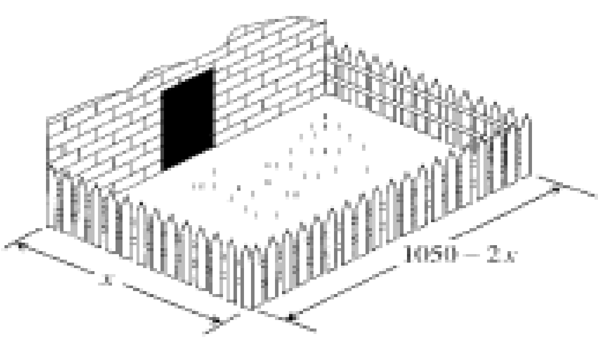
4. $f(x) = x^3 - 4x^2 + 4x$

5. $f(x) = x^3 + 7x^2 + 7x - 15$

6. $f(x) = x^4 - 2x^2 - 5x + 6$

7. $f(x) = -x^4 + x^3 + 4x^2 - 4x - 2$

8. A rectangular area is to be fenced against an existing wall. The three sides of the fence must be 1050 ft long. Find the dimensions of the maximum area that can be enclosed. What is the maximum area?



9. A 300-in. piece of wire is cut into two pieces. Each piece of wire is used to make a square wire frame. Let x be the length of one piece of the wire.

a. Find an algebraic representation that gives the total area of the 2 squares as a function of x.

b. Find a complete graph on your calculator of this algebraic representation.
c. What portion of the graph of the algebraic representation represents the problem situation?

d. Find the lengths of the two pieces of wire that produce two squares of minimum total area.

e. Is there a way to cut the wires so that the area of the two squares is a maximum total area?

10 **Market Research** A market analyst working for a small-appliance manufacturer finds that if the firm produces and sells x blenders annually, the total profit (in dollars) is

$$P(x) = 8x + 0.3x^2 - 0.0013x^3 - 372$$

Graph the function P in an appropriate viewing rectangle and use the graph to answer the following questions.

(a) When just a few blenders are manufactured, the firm loses money (profit is negative). (For example, $P(10) = -263.3$, so the firm loses \$263.30 if it produces and sells only 10 blenders.) How many blenders must the firm produce to break even?

(b) Does profit increase indefinitely as more blenders are produced and sold? If not, what is the largest possible profit the firm could have?

11 **Volume of a Box** An open box is to be constructed from a piece of cardboard 20 cm by 40 cm by cutting squares of side length x from each corner and folding up the sides, as shown in the figure.

(a) Express the volume V of the box as a function of x.

(b) What is the domain of V? (Use the fact that length and volume must be positive.)

(c) Draw a graph of the function V and use it to estimate the maximum volume for such a box.