(c) If you expect to use 260 peak time minutes per month, which option provides the best deal? If you expect to use 320 peak time minutes per month, which option provides the best deal?

(d) If you expect to use 410 peak time minutes per month, which option provides the best deal? If you expect to use 450 peak time minutes per month, which option provides the best deal?

(e) Each monthly charge includes a specific number of peak time minutes included in the monthly fee. Write a function for each available option, where C is the monthly cost and x is the number of peak time minutes used.

(f) Graph the functions corresponding to each option.

(g) At what point does Option 2 become a better deal than Option 1?

(h) At what point does Option 3 become a better deal than Option 2?

This project is based on information given in a "Cingular Wireless" advertisement in the *Denton Record Chronicle* on September 11, 2001.

2. Cost of Cable   You work for the Silver Satellite & Cable TV Company in the Research & Development Department. You have been asked to come up with a formula to determine the cost of running cable from a connection box to a new cable household. The first example that you are working with involves the Steven family, who own a rural home with a driveway 2 miles long extending to the house from a nearby highway. The nearest connection box is along the highway but 5 miles from the driveway.

It costs the company $100 per mile to install cable along the highway and $140 per mile to install cable off the highway. Because the Steven's house is surrounded by farmland that they own, it would be possible to run the cable overland to the house directly from the connection box or from any point between the connection box to the driveway.

(a) Draw a sketch of this problem situation, assuming that the highway is a straight road and the driveway is also a straight road perpendicular to the highway. Include two or more possible routes for the cable.

(b) Let x represent the distance in miles that the cable runs along the highway from the connection box before turning off toward the house. Express the total cost of installation as a function of x. (You may choose to answer part (c) before part (b) if you would like to examine concrete instances before creating the equation.)

(c) Make a table of the possible integral values of x and the corresponding cost in each instance. Does one choice appear to cost the least?

(d) If you charge the Stevens $800 for installation, would you be willing to let them choose which way the cable would go? Explain.

(e) Using a graphing calculator, graph the function from part (b) and determine the value of x that would make the installation cost minimum.

(f) Before proceeding further with the installation, you check the local regulations for cable companies and find that there is pending state legislation that says that the cable cannot turn off the highway more than 0.5 mile from the Steven's driveway. If this legislation passes, what will be the ultimate cost of installing the Steven's cable?

(g) If the cable company wishes to install cable in 5000 homes in this area, and assuming that the figures for the Steven's installation are typical, how much will the new legislation cost the company overall if they cannot use the cheapest installation cost, but instead have to follow the new state regulations?

Cumulative Review

1. Solve the following equation by factoring: $x^3 - 6x^2 + 8x = 0$. Verify your results using a graphing utility.

2. Solve the inequality $3x + 2 \leq 5x - 1$ and graph the solution set.

3. Find the center and radius of the circle $x^2 + 4x + y^2 - 2y - 4 = 0$. Graph the circle by hand.

4. For the equation $y = x^3 - 9x$, determine the intercepts and test for symmetry. Verify your results using a graphing utility.

5. Find an equation of the line perpendicular to $3x - 2y = 7$ that contains the point $(1, 5)$.

6. Determine whether the following graph represents a function: