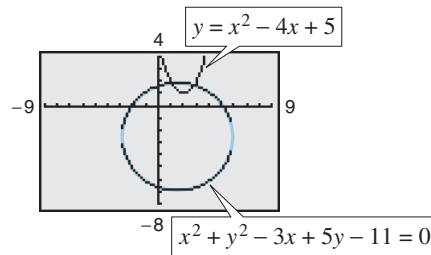


Chapter 2 Project *Finding Points of Intersection*

You can use the *zoom* and *trace* features or the *intersect* feature of a graphing utility to approximate the points of intersection of the graphs of equations. In this project you will find the points of intersection of the circle and parabola given by

$$x^2 + y^2 - 3x + 5y - 11 = 0 \quad \text{and} \quad y = x^2 - 4x + 5.$$

- Begin by writing the circle as the union of two functions. Identify the functions that represent the top half and the bottom half of the circle.
- Use a graphing utility to graph all three functions in the same viewing window, as shown in the figure below. Use the *intersect* feature of the graphing utility to approximate the points of intersection.



Questions for Further Exploration

- Using a window setting of $1.05 \leq x \leq 1.06$ and $1.89 \leq y \leq 1.90$, graph the top half of the circle and the parabola in the example in the same viewing window. Then use the *trace* feature to approximate (accurate to three decimal places) the y -coordinate of the point of intersection that is shown on the screen.
- Another method for finding the points of intersection is to substitute $x^2 - 4x + 5$ for y in the equation of the circle to get a fourth-degree polynomial equation. Graph this equation.
 - Find a setting that allows you to use the *trace* feature to approximate the solution $x \approx 1.055$ of the polynomial equation to four decimal places.
 - Find a setting that allows you to use the *trace* feature to approximate the solution $x \approx 2.841$ to four decimal places.

- Use a graphing utility to find the points of intersection of the circle and the parabola given by

$$x^2 + y^2 - 5x + 4y - 13 = 0$$

$$y = x^2 - 3x + 2.$$

- The *market equilibrium* of a commodity is the quantity (and corresponding price) at which the supply of the commodity and the demand for the commodity are equal. The supply and demand curves for a business dealing with wheat are

$$\text{Supply: } p = 1.45 + 0.00014x^2$$

$$\text{Demand: } p = (2.388 - 0.007x)^2$$

where p is the price (in dollars per bushel) and x is the quantity (in bushels per day). Use a graphing utility to graph the supply and demand equations in the same viewing window and find the market equilibrium. (*Hint:* The *market equilibrium* is the point of intersection of the graphs for $x > 0$.)