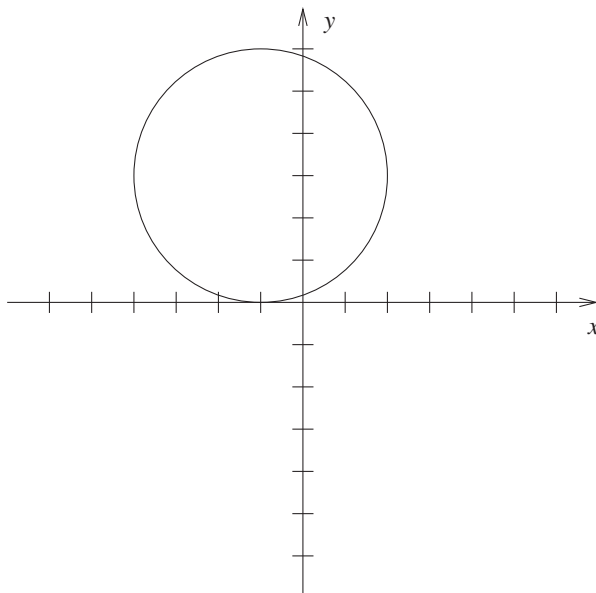


**MATH 103 Pre-Calculus Mathematics**  
**Quiz #2 Fall 2008**  
**Sample Solutions**

1. Give the standard form of the equation of the circle with center  $(-1, 3)$  and radius 3, and provide a sketch of this circle in the space below.

**Solution:** The standard form of the equation of a circle with center  $(h, k)$  and radius  $r$  is  $(x - h)^2 + (y - k)^2 = r^2$ . Plugging in  $-1$  for  $h$ ,  $3$  for  $k$ , and  $3$  for  $r$  (and doing the slightest bit of algebra and arithmetic), we get

$$(x + 1)^2 + (y - 3)^2 = 9$$



2. What is the center and radius of the circle described by the equation  $(x - 5)^2 + (y + 2)^2 = 3$ ?

**Solution:** The center is  $(5, -2)$  and the radius is  $\sqrt{3}$ .

**3.** What is the center and radius of the circle described by the equation  $x^2 - 2x + y^2 + 4y = 4$ ?

**Solution:** Using the “completing the square” method, we transform the given equation into one of standard form:

$$\begin{aligned} x^2 - 2x + y^2 + 4y &= 4 \\ \equiv (x^2 - 2x + 1) + (y^2 + 4y + 4) &= 4 + 1 + 4 \quad (\text{completing the square}) \\ \equiv (x - 1)^2 + (y + 2)^2 &= 9 \quad (\text{factoring, arithmetic}) \end{aligned}$$

It follows that the center is  $(1, -2)$  and that the radius is 3. (Note that  $3^2 = 9$ .)