Quiz 8

1. Find the equation of the line through $(2, 1)$ which is perpendicular to the line $-6x + 3y = 2$. Put your answer in standard form.

   Answer. Our line is perpendicular to $-6x + 3y = 2$ which is the same as $y = 2x + 2/3$. So our line has slope $-1/2$. Using point slope form, this gives

   $$y - 1 = (-1/2)(x - 2) \to y - 1 = -x/2 + 1$$

   To put this in standard form, move the x over to get

   $$x/2 + y = 2.$$

   Finally, multiply everything by 2 to get rid of the fractions.

   $$x + 2y = 4.$$

   $\square$

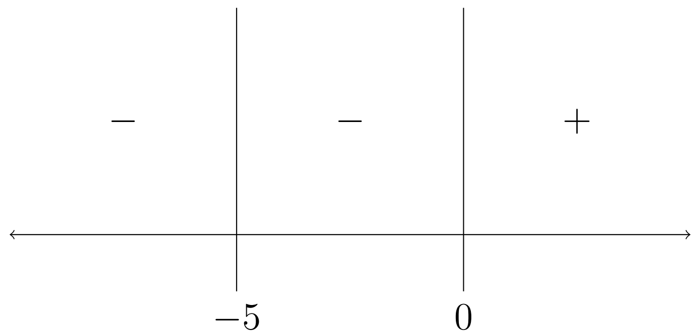
2. Solve for x. Put your answer in *interval notation*.

   $$x^3 + 10x^2 < -25x$$

   Answer. Move everything to one side, and find when it equals zero. Pulling out a zero and factoring gives

   $$x(x + 5)(x + 5) < 0$$

   So the zeroes are $x = 0, -5$. Plot these on a number line, and plug in points between each. This gives



We are looking for where this is *strictly* less than zero, which is $(-\infty, -5) \cup (-5, 0)$. $\square$

3. Graph. Label the center, the radius, and find the intercepts.

$$x^2 + y^2 - 6x + 8y + 9 = 0$$

Answer. Move the constant term over and group like terms to get

$$(x^2 - 6x) + (y^2 + 8y) = -9.$$

Then complete the square to get

$$(x^2 - 6x + 9) + (y^2 + 8y + 16) = -9 + 9 + 16.$$

Then factor to get

$$(x - 3)^2 + (y + 4)^2 = 16.$$

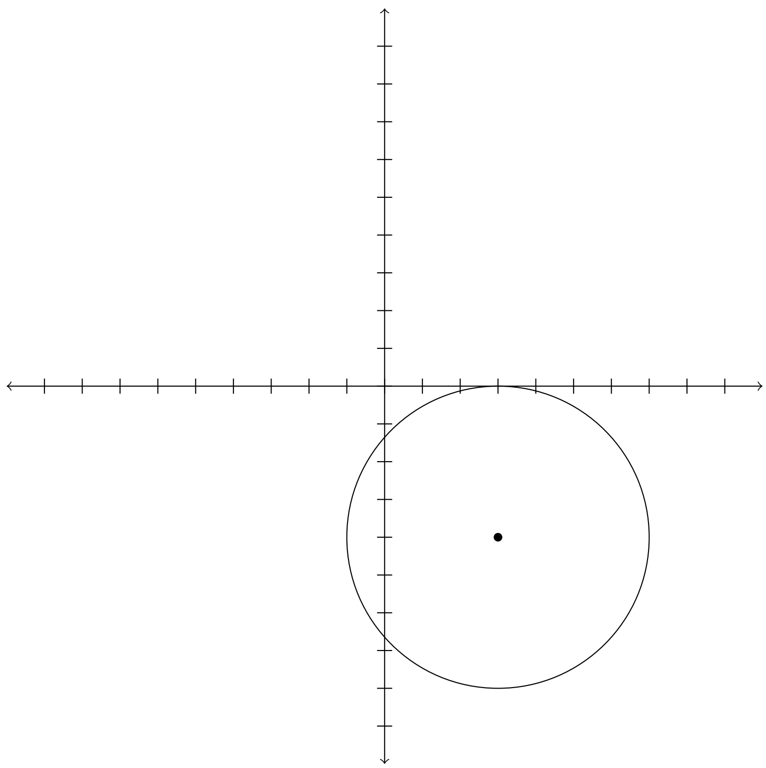
Then the center is $(3, 2)$ and the radius is 4. To find the x intercept, set $y = 0$. Then we have

$$(x - 3)^2 + 4^2 = 16$$

so $(x - 3)^2 = 0$, so $x = 3$.
For the y intercept set $x = 0$. This gives

$$(-3)^2 + (y + 4)^2 = 16$$

$$(y+4)^2 = 16 - 9 = 7$$
$$y + 4 = \sqrt{7}$$
$$y = -4 \pm \sqrt{7}.$$



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