

### Equations of Circles

$$Ax^2 + By^2 + Cx + Dy + E = 0 \rightarrow (x - h)^2 + (y - k)^2 = r^2$$

#### Converting from General to Standard Form:

1. A needs to be 1! Divide if needed.
2. Move the x terms together, the y terms together & E to the other side.
3. Complete the square (as needed) for x. Complete the square (as needed) for y.
4. Factor the left & simplify the right.

Write the standard form of the equation for the circle. State the center and radius.

1.  $x^2 + y^2 - 8x + 7 = 0$

$$x^2 - 8x + \underline{\quad} + y^2 + \underline{\quad} = -7$$

$$x^2 - 8x + 16 + y^2 + \underline{\quad} = -7 + 16$$

$$(x - 4)^2 + y^2 = 9$$

center: (4, 0) r: 3

2.  $x^2 + y^2 + 4x - 6y - 3 = 0$

$$x^2 + 4x + \underline{4} + y^2 - 6y + \underline{9} = 3$$

$$x^2 + 4x + 4 + y^2 - 6y + 9 = 3 + 4 + 9$$

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

center: (-2, 3) radius: 4

3.  $x^2 + y^2 + 22x + 8y + 88 = 0$

$$x^2 + 22x + \underline{\quad} + y^2 + 8y + \underline{\quad} = -88$$

$$x^2 + 22x + 121 + y^2 + 8y + 16 = -88 + 121 + 16$$

$$(x + 11)^2 + (y + 4)^2 = 49$$

center: (-11, -4) radius: 7

4.  $2x^2 + 2y^2 - 16x + 4y + 20 = 0$

5.  $x^2 + y^2 - 4x - 30y + 220 = 0$

$$x^2 - 4x + \underline{\quad} + y^2 - 30y + \underline{\quad} = -220$$

$$x^2 - 4x + 4 + y^2 - 30y + 225 = -220 + 4 + 225$$

$$(x - 2)^2 + (y - 15)^2 = 9$$

center: (2, 15) radius: 3

6.  $x^2 + y^2 - 22x + 28y + 313 = 0$

$$x^2 - 22x + 121 + y^2 + 28y + 196 = -313 + 121 + 196$$

$$(x - 11)^2 + (y + 14)^2 = 4$$

center: (11, -14) r: 2