(1)[3 points] State the center and radius of the circle:

$$x^2 + (y - 3)^2 = 36$$

center $(0, 3)$

radius $= \sqrt{36} = 6$

(2)[2 points] State the center and radius of the circle:

$$\left(x - \frac{1}{2}\right)^2 + \left(y + \frac{3}{2}\right)^2 = 1$$

center $\left(\frac{1}{2}, \frac{-3}{2}\right)$

radius $= 1$

(3)[5 points] Put the equation of the circle into standard form and find the center and radius:

$$x^2 + y^2 - 20x + 16y + 128 = 0$$
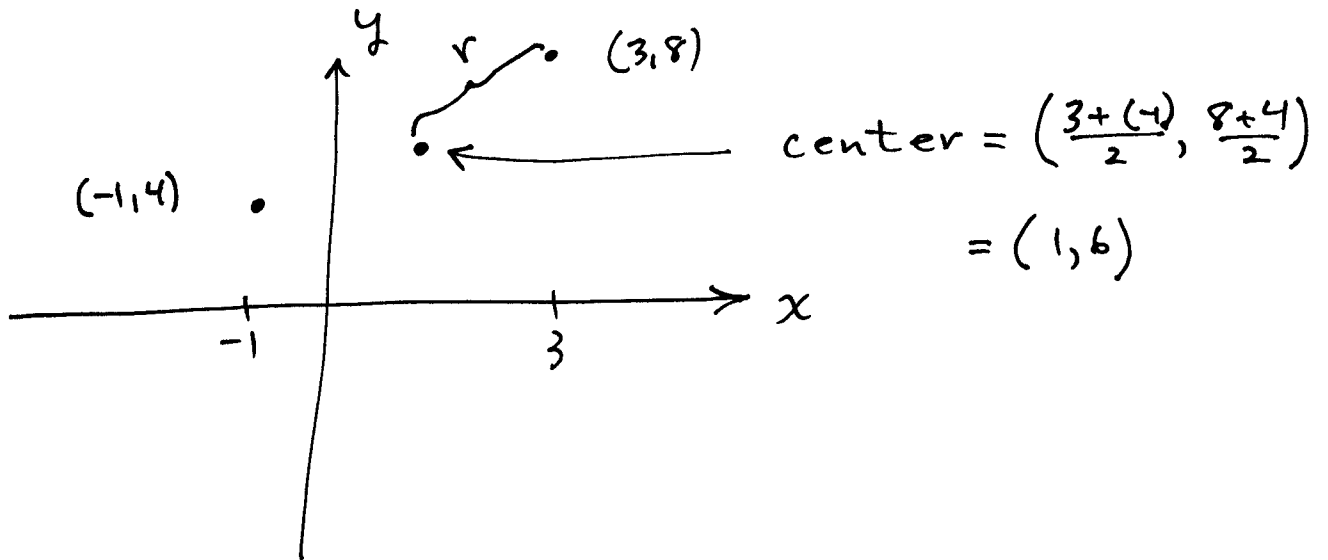
$$x^2 - 20x + y^2 + 16y + 128 = 0$$

$$(x-10)^2 - 100 + (y+8)^2 - 64 + 128 = 0$$

$$(x-10)^2 + (y+8)^2 = 36$$

$\therefore$ center $(10, -8)$

radius $= \sqrt{36} = 6$

(4)[**5 points**] Find the equation of the circle with endpoints of a diameter at $(-1, 4)$ and $(3, 8)$.

$$\text{center} = \left(\frac{3 + (-1)}{2}, \frac{8 + 4}{2} \right)$$

$$= (1, 6)$$

$$r = \sqrt{(8-6)^2 + (3-1)^2}$$

$$= \sqrt{4 + 4}$$

$$= \sqrt{8}$$

$\therefore$ equation is

$$(x-1)^2 + (y-6)^2 = 8$$