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1 $x^2 + y^2 + 2x + 6y + 6 = 0$

Solution

$x^2 + 2x + y^2 + 6y = -6$

$(x+1)^2 + (y+3)^2 = -6 + (1)^2 + 3^2$

$(x+1)^2 + (y+3)^2 = -6 + 1 + 9$

$(x+1)^2 + (y+3)^2 = 4$

Compare with

$(x-a)^2 + (y-b)^2 = r^2$

where (a, b) is the centre

$\therefore x - a = x + 1$

$a = -1$

$y - b = y + 3$

$b = -3$

the centre is $(-1, -3)$

recall $(x-a)^2 + (y-b)^2 = r^2$

$\therefore r^2 = 4$

$r = 2$ units

2 $x^2 + y^2 - 4x + 10y - 8 = 0$

Solution

$x^2 - 4x + y^2 + 10y = 8$

$(x-2)^2 + (y+5)^2 = 8 + (-2)^2 + (5)^2$

$(x-2)^2 + (y+5)^2 = 8 + 4 + 25$

$(x-2)^2 + (y+5)^2 = 37$

Compare with

$(x-a) + y-b) = r^2$

$a = 2$, $b = -5$, $r^2 = 37$, $r = \sqrt{37}$ units

$\therefore$ the center is $(2, -5)$

radius is $\sqrt{37}$ units