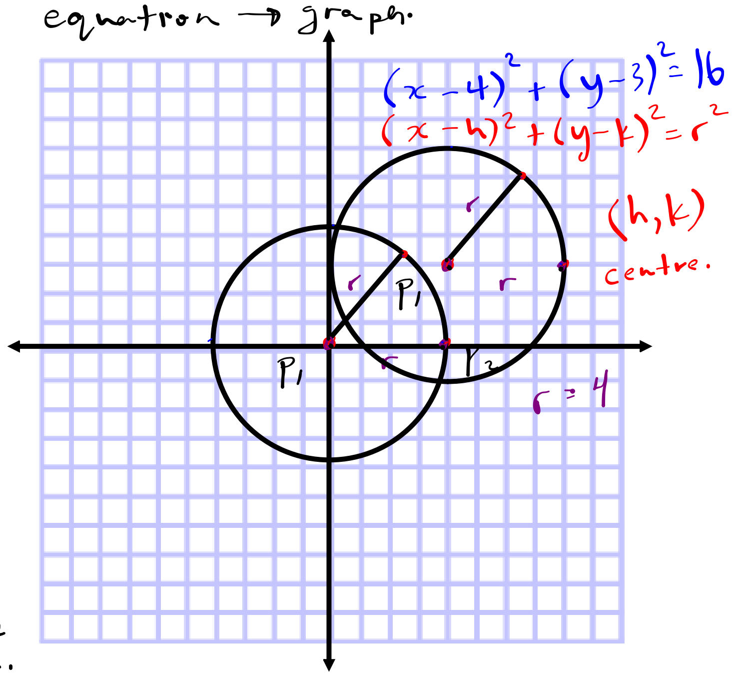
Unit 1: Graphing a Circle

equation → graph.

Definition: a circle is a set of data points all equal distance to the center.



$$d = \sqrt{(x_2-x_1)^2+(y_2-y_1)^2}$$

$$(4)^2 = \left(\sqrt{(x_2-0)^2+(y_2-0)^2}\right)^2$$

$$16 = (x_2)^2 + (y_2)^2$$

$$x^2+y^2=16$$

$x^2+y^2 = r^2$ → equation of a circle centered at origin.

graph the conic

$-(-2)$

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

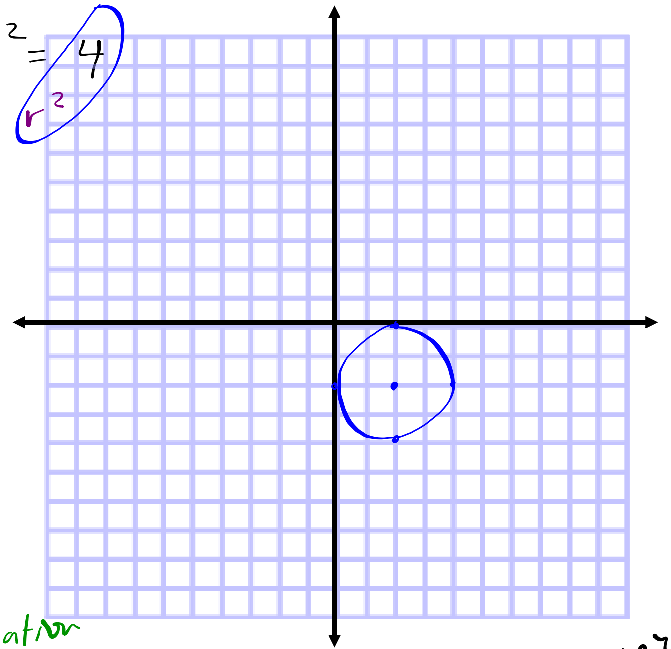
$(x-h)^2 + (y-k)^2 = r^2$

centre
O $(2,-2)$

$r = 2$

$\sqrt{4} = \sqrt{r^2}$

$r = 2$



Domain: the x-values the conic uses.

$[0, 4]$ - interval notation

$D = \{x \in \mathbb{R} \mid 0 \leq x \leq 4\}$ set builder's notation

Range: the y-values the conic uses.

$\{-4, 0\}$ $R = \{y \in \mathbb{R} \mid -4 \leq y \leq 0\}$

graph and state Domain / Range

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

$(x-h)^2 + (y-k)^2 = r^2$

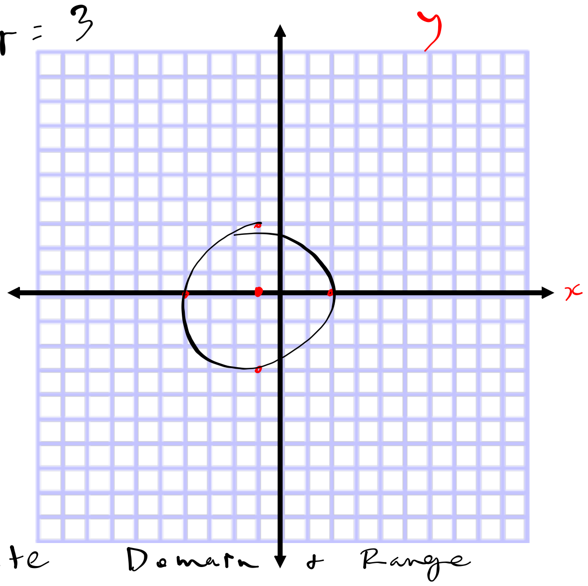
Find $C(h,k)$
radius r

$\sqrt{r^2} = \sqrt{9}$ isolate → opposite operation

$C(-1,0)$ $r = 3$

D: [-4, 2]

R: [-3, 3]



graph - and state Domain + Range

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

graph and state domain and range

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

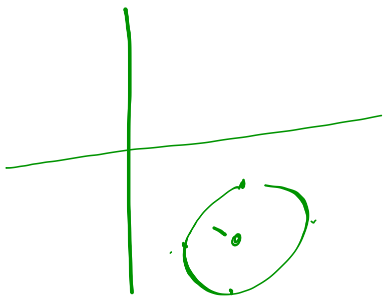
$$(x-h)^2 + (y-k)^2 = r^2$$

$h = 4$ $\quad r^2 = 4$

$k = -4$ $\quad r = 2$

D{ h-r , h+r }

R[,]



graph

$x^2 + y^2 - 8x + 4y + 11 = 0$

$x^2 + y^2 + Dx + Ey + F = 0$

$D = -8$
$E = 4$
$F = 11$

$C\left(-\frac{D}{2}, -\frac{E}{2}\right)$

$r = \sqrt{-F + \left(\frac{D}{2}\right)^2 + \left(\frac{E}{2}\right)^2}$

$r = \sqrt{\left(-11 + \left(\frac{-8}{2}\right)^2 + \left(\frac{4}{2}\right)^2\right)}$

$C\left(\frac{-(-8)}{2}, -\frac{4}{2}\right)$

$C(4, -2)$

$r = 3$

$r = \sqrt{-11 + 16 + 4}$

$r = \sqrt{9}$

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graph and state Domain & Range

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

Convert from general form to standard form

$(x-h)^2+(y-k)^2=r^2$

$C(4,-2)$ $C\left(-\frac{D}{2},-\frac{E}{2}\right)$

$r($

$r=3$

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

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

$x^2-8x+16+y^2+4y+4=9$

$x^2+y^2-8x+4y+11=0$

$x^2+y^2-8x+4y+11=0$

completing the square:

$x^2-8x+(-4)^2+y^2+4y+(2)^2=-11+(-4)^2+(2)^2$

$\div 2$ $\div 2$

$=-11+16+4$

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

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

1.20 – 1.23

Convert from general to standard form:

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

Desk work till 4 or 4:15

pg 1.25 #2 → translation of (-2, -1)

graph ↑ centre.

pg 1.26 #3, #6

Unit 2 : Graphing a Relation Defined by a circle

→ equation

inequalities

shading { > < dotted line; ≥ ≤ solid line

ex. graph

$(x+3)^2 + (y-1)^2 > 25$

step i. change > to = and graph.

$(x+3)^2 + (y-1)^2 = 25$

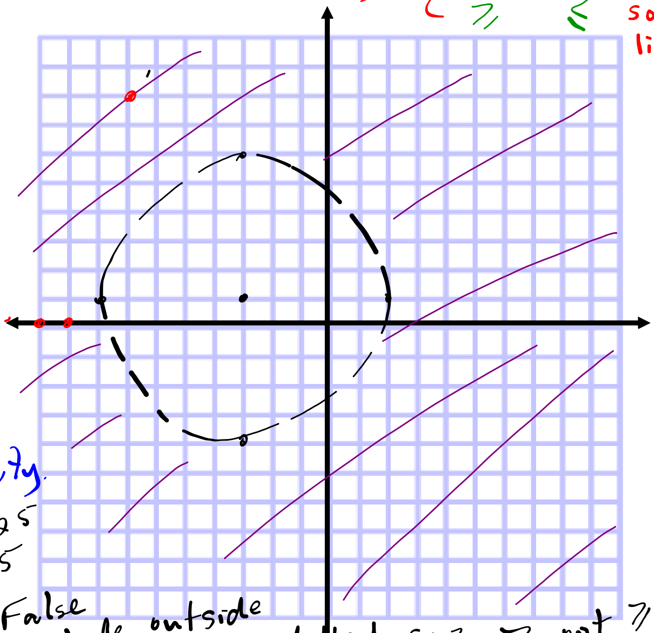
$(x-h)^2 + (y-k)^2 = r^2$

$C(h,k)$

$C(-3,1)$

$r^2 = 25$

$r = 5$



step ii. to see where to shade, sub in test point [not on line, like (h,k)C.] into original inequality.

sub $C(\underset{x}{-3}, \underset{y}{1})$ in $(x+3)^2 + (y-1)^2 > 25$

$(-3+3)^2 + (1-1)^2 > 25$

$0 > 25$

False so shade outside and make circle dotted cuz > not ≥

~~D]-∞, -8~~

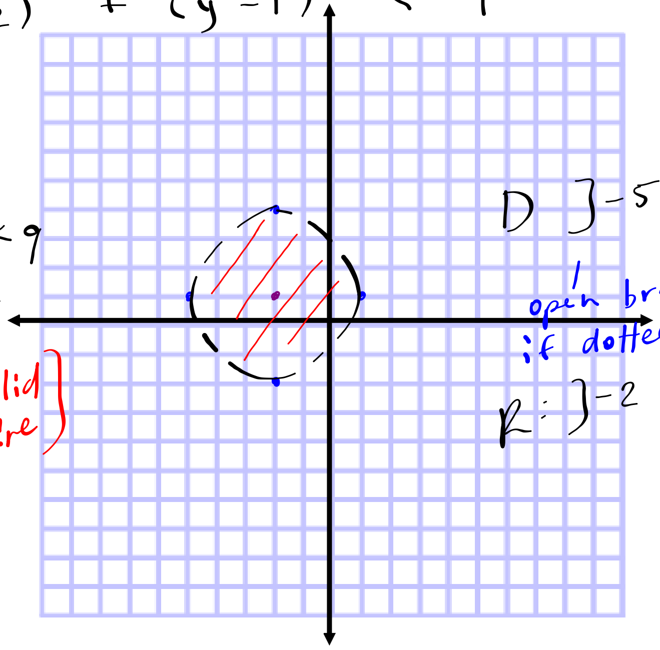
D ℝ

D]-∞, ∞[

R]-∞, ∞[

graph and state domain / range

$(x+2)^2 + (y-1)^2 < 9$



$(-2+2)^2 + (1-1)^2 < 9$

$0 < 9$ True

dotted line

$\leq \to$ solid line

D]-5, 1[

open bracket if dotted line

R:]-2, 4[

graph and state Domain & Range

$x^2 + y^2 - 4x + 6y + 4 > 0$

shading sub in $(\underset{x}{2}, \underset{y}{-3})$

$2^2 + (-3)^2 - 4(2) + 6(-3) + 4 > 0$

$-9 > 0$ → False
so shade where centre is not