September 13, 2010

Note Title 9/13/2010

§2.3 #62

$(x_1, y_1) = (-4, -3)$ $(x_2, y_2) = (5, 1)$

Equation of line:

$y - y_1 = m(x - x_1)$ point slope.

slope $m = \dfrac{y_2 - y_1}{x_2 - x_1}$

$= \dfrac{1 - (-3)}{5 - (-4)} = \dfrac{4}{9}$

slope intercept form

$y = mx + b$

$m = \dfrac{4}{9}$

$$y - y_1 = \frac{4}{9}(x - x_1)$$

$$y - (-3) = \frac{4}{9}(x - (-4))$$

$$y + 3 = \frac{4}{9}(x + 4)$$

Slope intercept: $y = mx + b$

$$y = -3 + \frac{4}{9}x + \frac{16}{9}$$

$$= \frac{4}{9}x - \frac{27}{9} + \frac{16}{9}$$

$$\boxed{y = \frac{4}{9}x - \frac{11}{9}}$$

$$y = \frac{4}{9}x + b$$

use a point find intercept

$$(x_1, y_1) = (-4, -3)$$

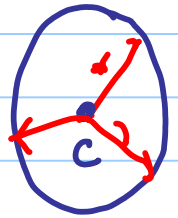
$$-3 = \frac{4}{9}(-4) + b$$

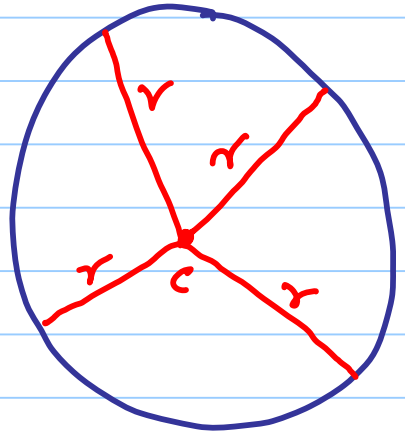
$$-3 = \frac{-16}{9} + b$$

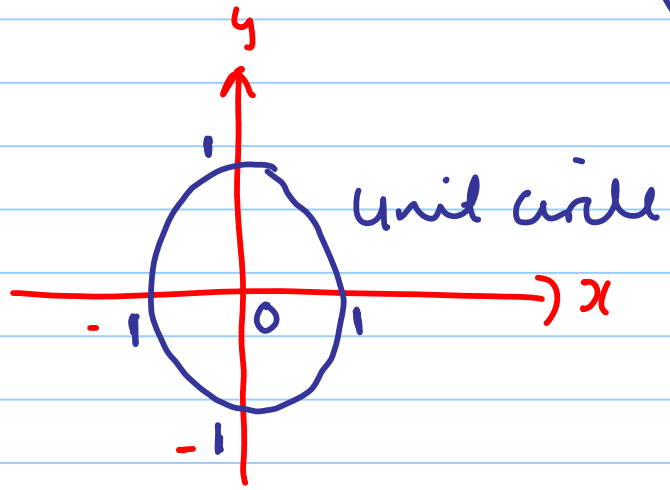
$$-\frac{11}{9} = b$$

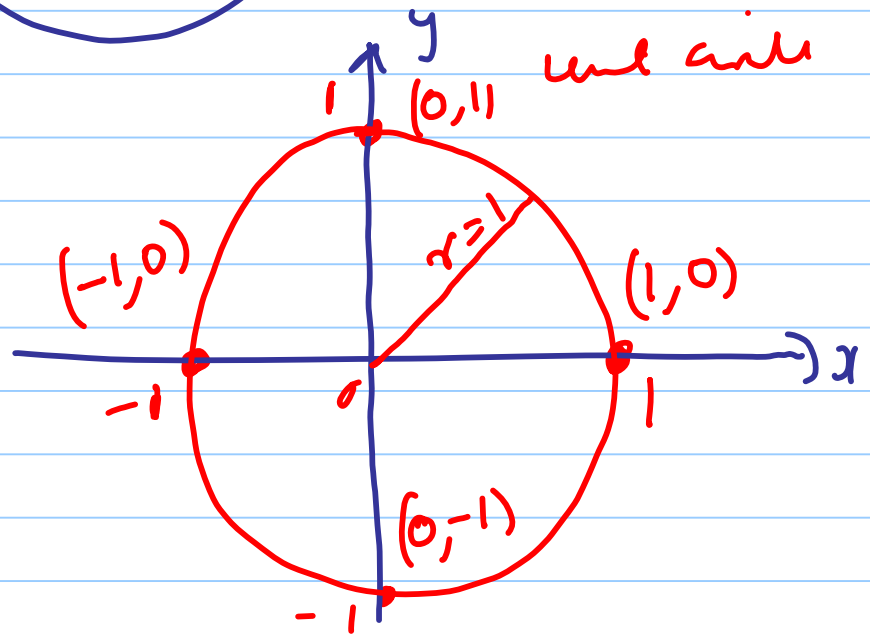
$$\boxed{y = \frac{4}{9}x - \frac{11}{9}}$$

2.4 CIRCLES


r
r
C


r
r
r
C
r


y
1
unit circle
x
-1
0
1
-1


y
unit circle
1
(0,1)
r=1
(-1,0)
(1,0)
x
-1
0
1
(0,-1)
-1

Example

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

Standard form:

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

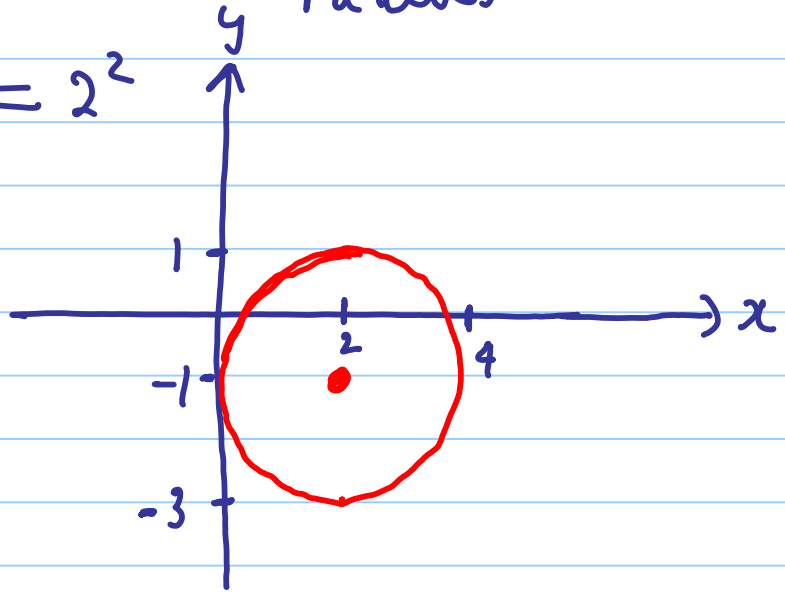
center (h,k)

radius r

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

$(h,k) = (2,-1)$

$r = 2$



Example

$$\left(x-\frac{1}{2}\right)^2+\left(y+\frac{1}{3}\right)^2=20$$

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

radius $r=\sqrt{20}=2\sqrt{5}$

Example 3

Center $(h,k)=(-2,3)$

radius $r=5$

Equation

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

$$(x-(-2))^2 + (y-3)^2 = 5^2$$

$$\boxed{(x+2)^2 + (y-3)^2 = 25}$$

Example

Center is $(7,-8)$

$(x_1, y_1) = (10,-4)$ on circle.

Find equation in general form!

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

$$(x-7)^2 + (y-(-8))^2 = r^2$$

$$(x-7)^2 + (y+8)^2 = r^2$$

$$(10-7)^2 + (-4+8)^2 = r^2$$ using given point

$$3^2 + 4^2 = r^2$$

$$9 + 16 = r^2$$

$$25 = r^2 \implies \boxed{r = 5}$$

So $$(x-7)^2 + (y+8)^2 = 25$$

General form $x^2 + y^2 + ax + by + c = 0$

$$x^2 - 14x + 49 + y^2 + 16y + 64 = 25$$

$$x^2 + y^2 - 14x + 16y + 113 = 25$$

$$\boxed{x^2 + y^2 - 14x + 16y + 88 = 0}$$

Example Completing the square

$$x^2 - 8x + y^2 + 20y + 107 = 0$$

$$(x^2 - 8x) + (y^2 + 20y) = -107$$

$$\underbrace{\left(x^2 - 8x + \left(\frac{-8}{2}\right)^2\right)} + \left(y^2 + 20y + \left(\frac{20}{2}\right)^2\right) = -107 + \left(\frac{8}{2}\right)^2 + \left(\frac{20}{2}\right)^2$$

$$(x - 4)^2 + (y + 10)^2 = -107 + 16 + 100$$

$$(x-4)^2 + (y+10)^2 = 9$$

Center $(h, k) = (4, -10)$ radius $r = 3$