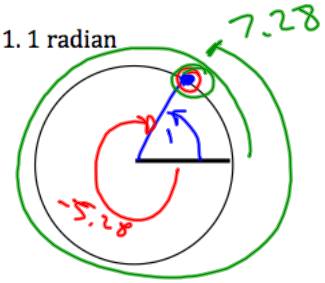
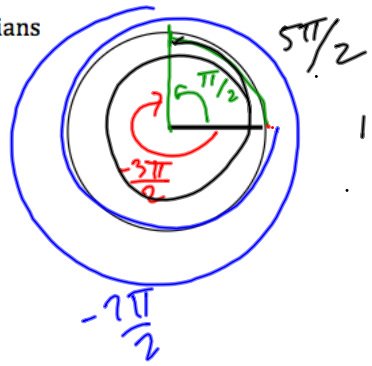
Warm-Up:

Draw each angle. Include an arrow representing the amount of rotation. Find the measure of one other angle that is coterminal with the given angle. Give the quadrant of each angle.

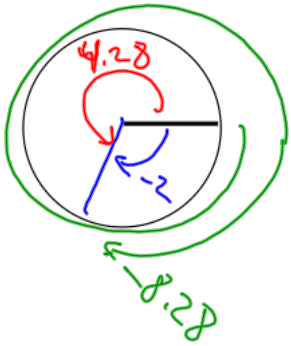
1. 1 radian



2. $\frac{\pi}{2}$ radians



3. -2 radians

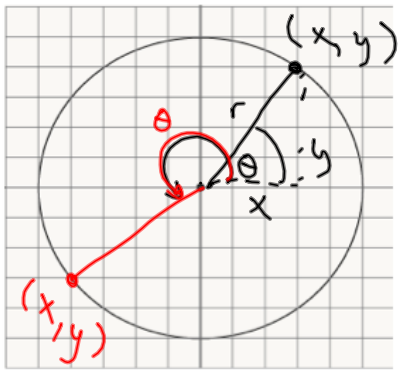


CIRCULAR TRIGONOMETRY

If (x,y) is a point on the terminal side of an angle θ and the distance from the point to the origin is $r=\sqrt{x^2+y^2}$. $x^2+y^2=r^2$

$\sin\theta=\frac{y}{r}$ $\cos\theta=\frac{x}{r}$ $\tan\theta=\frac{y}{x}$

Opp = y
Adj = x
Hyp = r



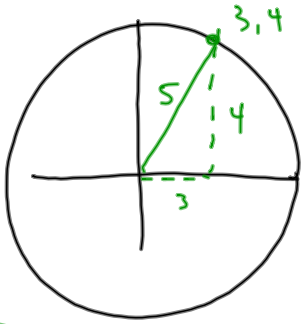
$\sin\theta=\frac{Opp}{Hyp}=\frac{y}{r}$

$\cos\theta=\frac{Adj}{Hyp}=\frac{x}{r}$

$\tan\theta=\frac{Opp}{Hyp}=\frac{y}{x}$

EX#2: The terminal side of an angle θ goes through the given point. Find the value of the three trigonometric functions of angle θ.

a. (3,4)



$x = 3$

$y = 4$

$r = 5$

$r = \sqrt{x^2+y^2}$

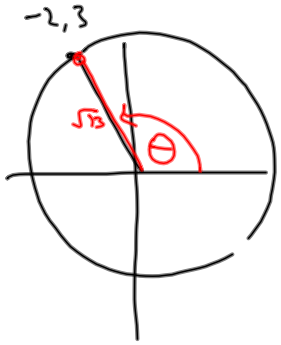
$r = \sqrt{3^2+4^2} = 5$

$\tan\theta = \frac{y}{x} = \frac{4}{3}$

$\sin\theta = \frac{y}{r} = \frac{4}{5}$

$\cos\theta = \frac{x}{r} = \frac{3}{5}$

b. (−2,3)



$x = -2$

$y = 3$

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

$r = \sqrt{4+9}$

$r = \sqrt{13}$

$\sin\theta = \frac{y}{r} = \frac{3}{\sqrt{13}}\frac{\sqrt{13}}{\sqrt{13}} = \frac{3\sqrt{13}}{13}$

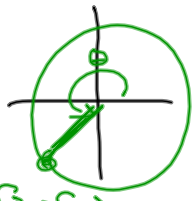
$\cos\theta = \frac{x}{r} = \frac{-2}{\sqrt{13}}\frac{\sqrt{13}}{\sqrt{13}} = \frac{-2\sqrt{13}}{13}$

$\tan\theta = \frac{y}{x} = \frac{3}{-2}$

c. $(-\sqrt{2},-\sqrt{2})$

$x = -\sqrt{2}$

$y = -\sqrt{2}$



$r = \sqrt{(-\sqrt{2})^2 + (-\sqrt{2})^2}$

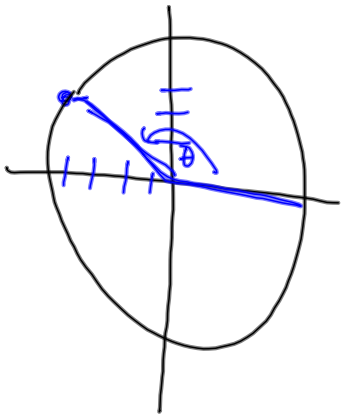
$r = \sqrt{2+2} = 2$

$\tan\theta = \frac{y}{x} = \frac{-\sqrt{2}}{-\sqrt{2}} = 1$

$\sin\theta = \frac{y}{r} = \frac{-\sqrt{2}}{2}$

$\cos\theta = \frac{x}{r} = \frac{-\sqrt{2}}{2}$

d. $(-4,3)$ $x = -4$ $y = 3$ $r = 12$ 5



$r = \sqrt{-4^2+3^2} = \sqrt{16+9}$

$= \sqrt{144}$ $= \sqrt{25}$

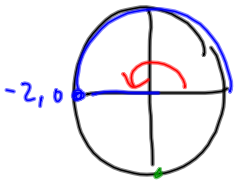
$r = 12$ $= 5$

$\cos\theta = \frac{-4}{5}$

$\tan\theta = \frac{3}{-4}$

$\sin\theta = \frac{3}{5}$

e. $(-2,0)$



$x = -2$

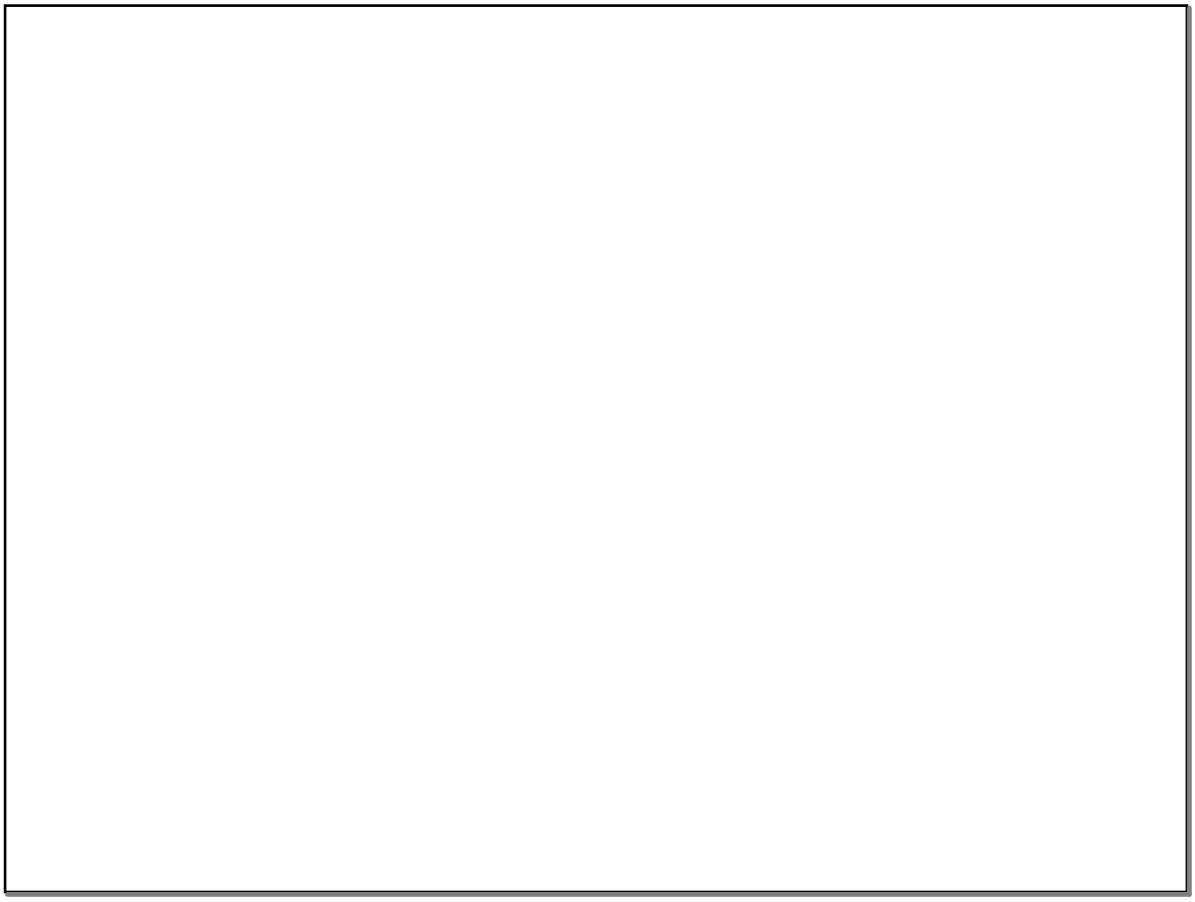
$y = 0$

$r = \sqrt{(-2)^2 + 0^2}$

$r = \sqrt{4} = 2$

$\sin\theta = \frac{y}{r} = \frac{0}{2} = 0$

$\cos\theta = \frac{x}{r} = \frac{-2}{2} = -1$

$\tan\theta = \frac{y}{x} = \frac{0}{-2} = 0$

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