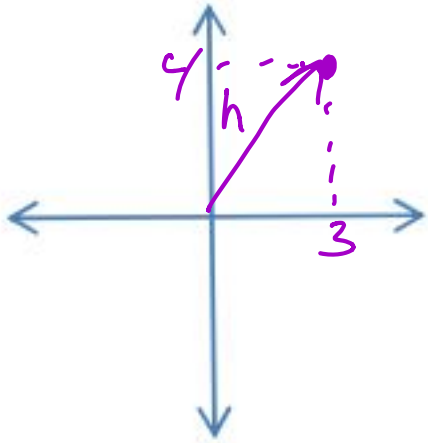
Trigonometric Ratios

SOH CAH TOA

$$sin(\theta) = \frac{\text{opposite}}{\text{hypotenuse}} \quad cos(\theta) = \frac{\text{adjacent}}{\text{hypotenuse}} \quad tan(\theta) = \frac{\text{opposite}}{\text{adjacent}}$$

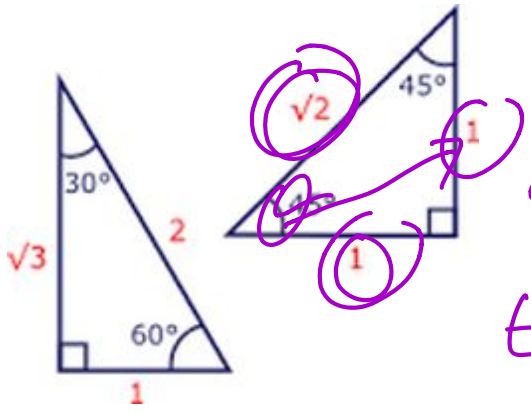
COS K

If we are given a point, P(x, y), we will have 2 of the three distances that we need to know. We will still need to figure out the distance to the origin, r. The pythagorean theorem will help us here.



P(3, 4)

$$h^2 = 3^2 + 4^2$$
$$= 5$$



$\sin 45 = \frac{1}{\sqrt{2}}$

$= \frac{\sqrt{2}}{2}$

$\cos 45 = \frac{\sqrt{2}}{2}$

$\tan x = \frac{\sin x}{\cos x}$

$= \frac{\sqrt{2}/2}{\sqrt{2}/2}$

$= 1$

In Quadrant 1 (Q1) the angle (θ) and the reference angle (θ_r) are the same. For any other quadrant you will use the reference angle to determine the value of the trigonometric ratio then you will need to use logic (or memorization) to determine the sign of the angle.

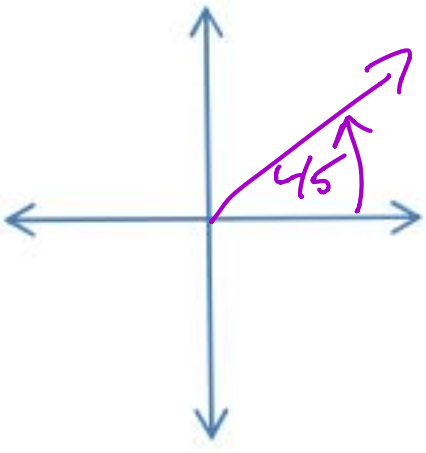
Let's do one in each quadrant.
Find the sine, cosine, and tangent for θ in each graph.

$45°$

$\sin\theta = \frac{\sqrt{2}}{2} \rightarrow \frac{1}{\sqrt{2}}$

$\cos\theta = \frac{\sqrt{2}}{2}$

$\tan\theta = 1$



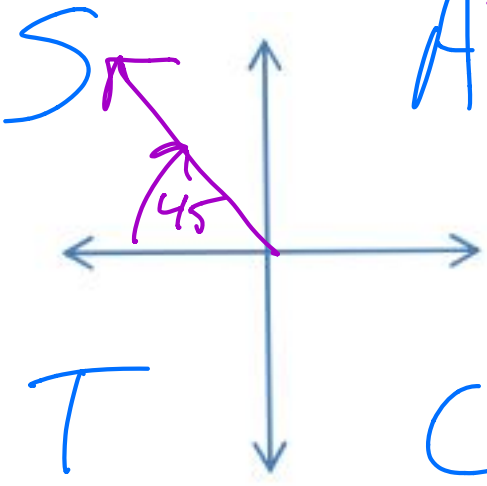
$135°$

$\sin\theta = \frac{\sqrt{2}}{2}$

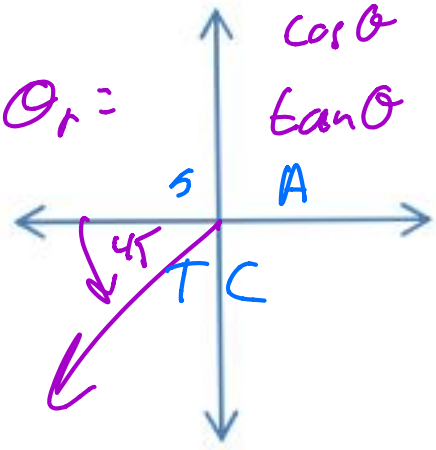
$\cos\theta = -\frac{\sqrt{2}}{2}$

$\tan\theta = -1$

S A T C



225°



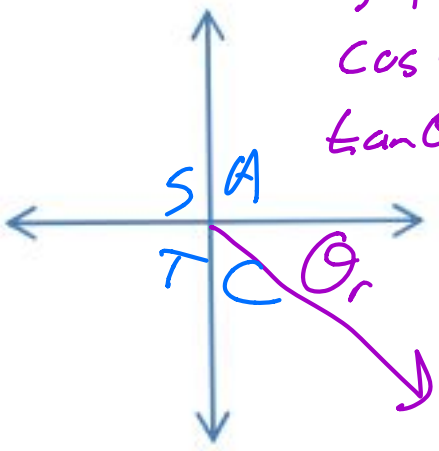
$\sin\theta = -\frac{\sqrt{2}}{2}$

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

$\theta_r =$

$\tan\theta = 1$

315°

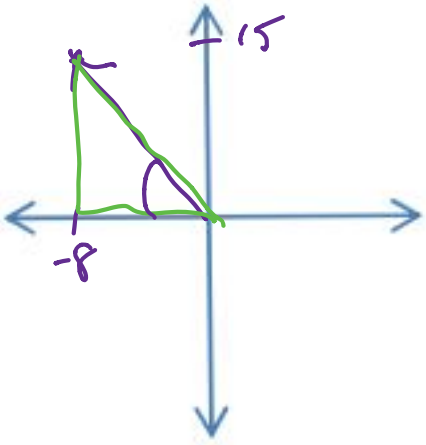


$\sin\theta = -\frac{\sqrt{2}}{2}$

$\cos\theta = \frac{\sqrt{2}}{2}$

$\tan\theta = -1$

Point, P(-8, 15) lies on the terminal arm of an angle θ, in standard position. Determine the exact trig ratios for $sin(\theta), cos(\theta),$ and $tan(\theta)$.



$h = \sqrt{15^2 + 8^2}$

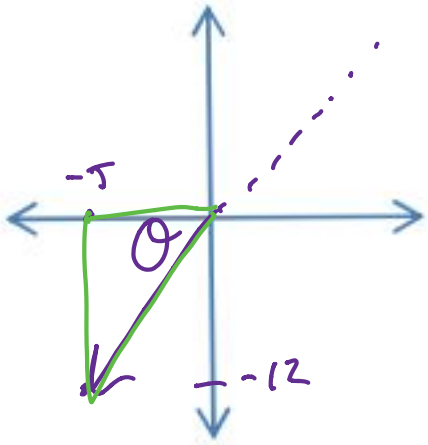
$= 17$

$\sin\theta = \frac{15}{17}$

$\cos\theta = \frac{-8}{17}$

$\tan\theta = \frac{-15}{8}$

The point, P(-5, -12) lies on the terminal arm of an angle θ in standard position. Determine the exact trigonometric ratios for $sin(\theta), cos(\theta),$ and $tan(\theta)$.



$h = \sqrt{12^2 + 5^2}$

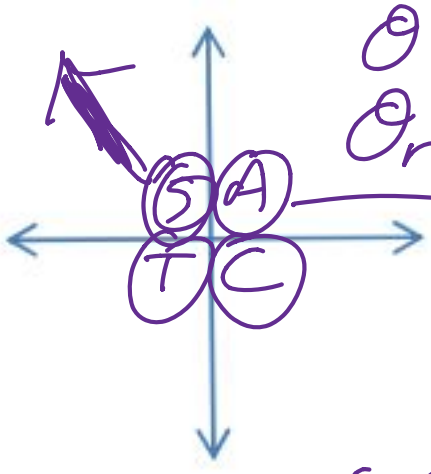
$= 13$

$\sin\theta = \frac{-12}{13}$

$\cos\theta = \frac{-5}{13}$

$\tan\theta = \frac{12}{5}$

Determine the exact value of ~~$\cos(135^\circ)$~~ $\cos(150)$



$\theta = 135$

$\theta_r = 45$

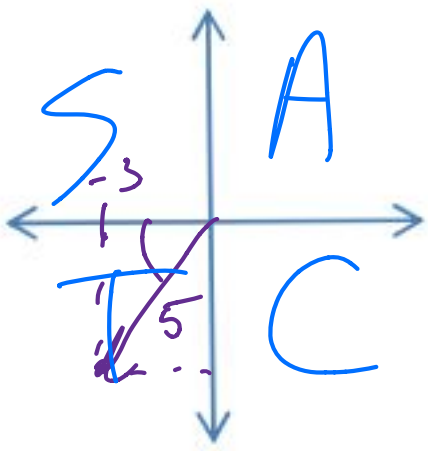
$\frac{\sqrt{2}}{2}$

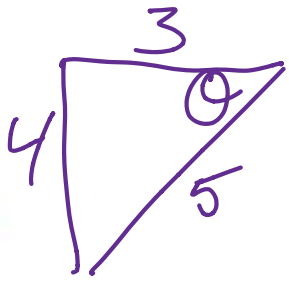
$\theta = 150$

$\theta_r = 30$

$\cos(150) = -\frac{\sqrt{3}}{2}$

Suppose θ is an angle in standard position with terminal arm in Q3, and $cos(\theta) = -\frac{3}{5}$. What are the exact values of $sin(\theta), cos(\theta),$ and $tan(\theta)$?





$y = \sqrt{5^2 - 3^2}$
$= 4$

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

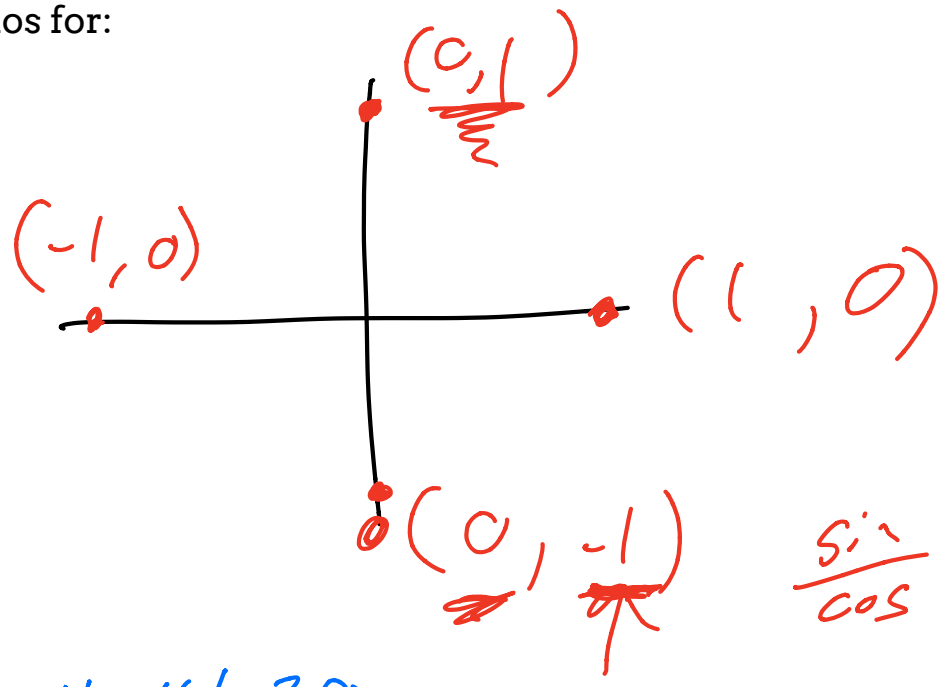
$\cos\theta = -\frac{3}{5}$

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

sin → y
cos → x

Determine the trig ratios for:

$\theta = 90°$
$\theta = 180°$
$\theta = 270°$
$\theta = 360°$



$\frac{\sin}{\cos}$

HW 2.2
2, 3, 5, 9, 11, 14, 20