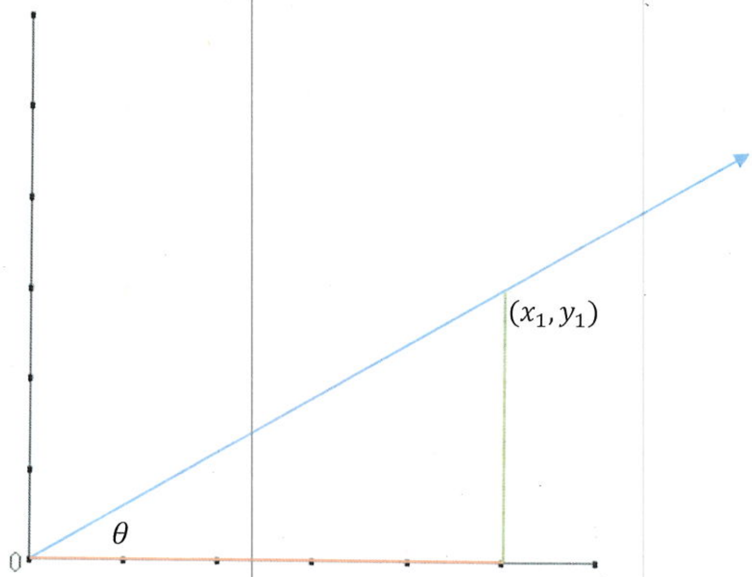
MAT 142, Trigonometric Functions Activity, Spring 2017 Name KEY

There is a relationship between trigonometric functions and algebraic functions we have learned in previous courses. Consider a line passing through the origin and the point (x_1, y_1).



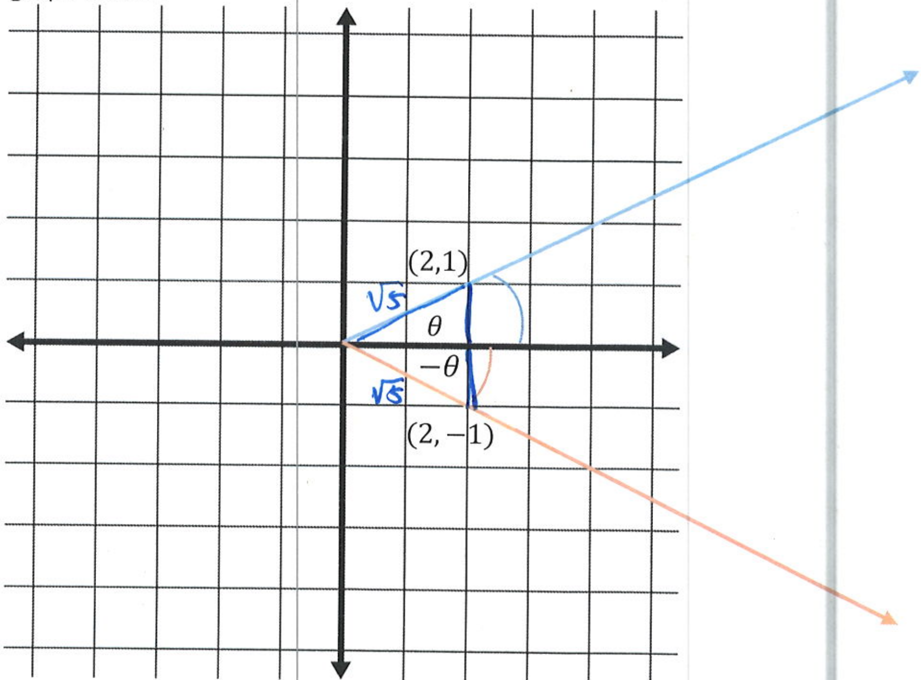
What trig function of θ is represented by the slope of the line passing through the point (x_1, y_1)?

$$\text{slope} = m = \frac{\Delta y}{\Delta x} = \frac{y_1}{x_1} = \frac{\text{opp}}{\text{adj}} = \tan\theta$$

What would be the equation of the line, passing through the origin, in terms of θ?

$$y = [\tan\theta]x$$

Consider a line passing through the point $(2,1)$ making an angle θ with the positive x-axis, and a second line passing through the point $(2,-1)$ making an angle $-\theta$ with the positive x-axis, as shown in the graph below.



Find the values of sine and cosine for θ, and $-\theta$.

$\sin(\theta) = \frac{1}{\sqrt{5}}$ $\sin(-\theta) = \frac{-1}{\sqrt{5}}$

$\cos(\theta) = \frac{2}{\sqrt{5}}$ $\cos(-\theta) = \frac{2}{\sqrt{5}}$

What does this suggest about the properties of the trigonometric functions of sine and cosine? Are these functions even, odd, or neither? Would the relationship hold if we replaced $(2,1)$ and $(2,-1)$, with (x,y) and $(x,-y)$?

Sine is odd since sign changes for $-\theta$
Cosine is even since sign does not change for $-\theta$
yes, the relationship would hold.

Use the information above, the graph and your knowledge of trigonometric identities to determine if the remaining 4 trig functions are even, odd or neither.

$\tan\theta = \frac{\sin\theta \leftarrow \text{odd}}{\cos\theta \leftarrow \text{even}} \Rightarrow \text{odd}$ $\csc\theta = \frac{1 \leftarrow \text{even}}{\sin\theta \leftarrow \text{odd}} \Rightarrow \text{Odd}$

$\cot\theta = \frac{1 \leftarrow \text{even}}{\tan\theta \leftarrow \text{odd}} \Rightarrow \text{odd}$

$\sec\theta = \frac{1 \leftarrow \text{even}}{\cos\theta \leftarrow \text{even}} \Rightarrow \text{even}$