Key

13.3 Trig Functions of General Angles Notes Day 1

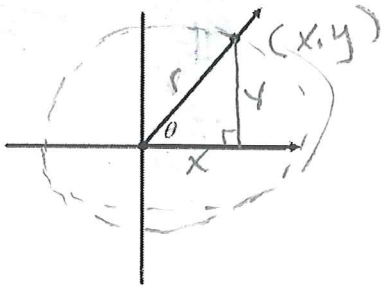
Example 1:

When point (x,y) is on the terminal side of angle θ the trig functions are defined as:

$\sin\theta = \frac{y}{r}$ $\csc\theta = \frac{r}{y} = \frac{1}{\sin\theta}$

$\cos\theta = \frac{x}{r}$ $\sec\theta = \frac{r}{x} = \frac{1}{\cos\theta}$

$\tan\theta = \frac{y}{x}$ $\cot\theta = \frac{x}{y} = \frac{1}{\tan\theta}$



Example 2:

Find the exact values of the 6 trig functions of θ if the terminal side contains (8,-15).

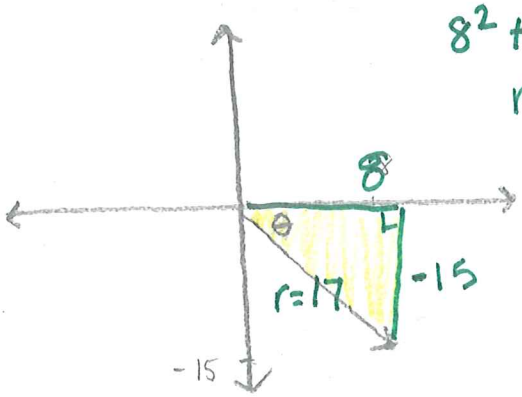
$\sin\theta = \frac{-15}{17}$ $\csc\theta = -\frac{17}{15}$

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

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

$8^2 + 15^2 = 289$

$r = \sqrt{289} = 17$



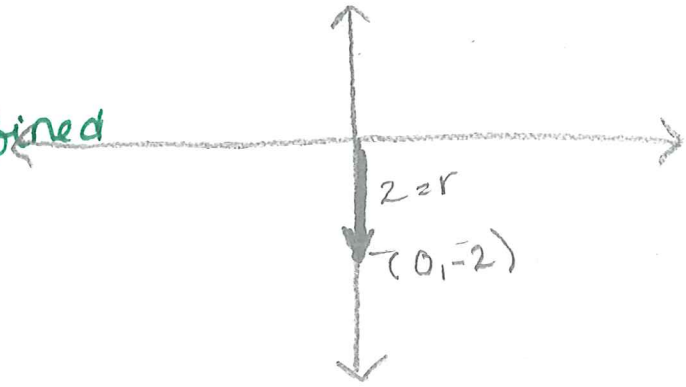
Example 3:

Find the exact values of the 6 trig functions of θ if the terminal side contains (0,-2).

$\sin\theta = \frac{y}{r} = \frac{-2}{2} = -1$ $\csc\theta = \frac{2}{-2} = -1$

$\cos\theta = \frac{x}{r} = \frac{0}{2} = 0$ $\sec\theta = \frac{2}{0} =$ undefined

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



$\tan\theta = \frac{y}{x} = \frac{-2}{3}$ $(3,-2)$ or $(-3,2)$

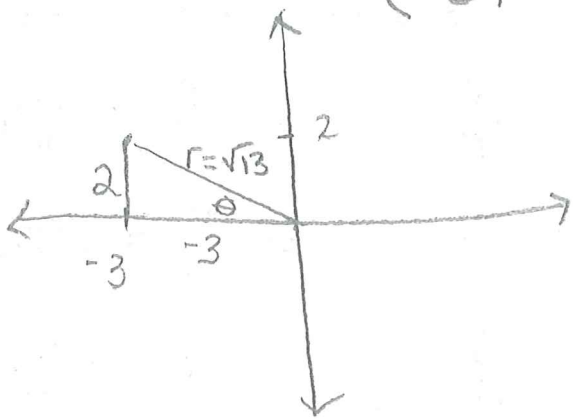
Example 4:

Suppose θ is an angle in Quadrant II and tan θ= $^{-2}/_{3}$. Find the exact values of the other five trig functions

sin θ = $\frac{2}{\sqrt{13}} = \frac{2\sqrt{13}}{13}$ csc θ = $\frac{\sqrt{13}}{2}$

cos θ= $\frac{-3}{\sqrt{13}} = \frac{-3\sqrt{13}}{13}$ sec θ= $\cancel{\frac{3\sqrt{13}}{13}}$ $-\frac{\sqrt{13}}{3}$

tan θ= $-\frac{2}{3}$ cot θ= $-3/2$



Example 5:

Suppose θ is an angle in Quadrant II and sin θ= $^{-6}/_{11}$. Find the exact values of the other five trig functions

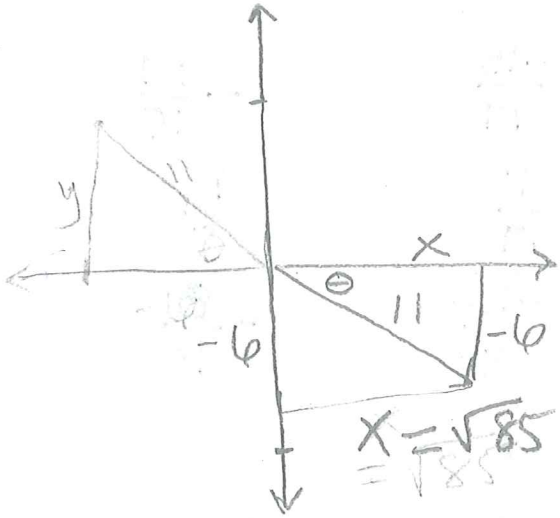
Quad IV

sin θ = $\frac{-6}{11}$ csc θ = $-11/6$

cos θ= $\frac{\sqrt{85}}{11}$ sec θ= $\frac{11\sqrt{85}}{85}$

tan θ= $\frac{-6}{\sqrt{85}}$ cot θ= $\frac{\sqrt{85}}{-6}$

$\theta = \frac{-6\sqrt{85}}{85}$



$\sin\theta = \frac{y}{r}$ (x, y)

$(-6)^2 + x^2 = 11^2$

$x^2 = 85$

$x = \sqrt{85}$