9.2 - Day 3 - Trig. Functions of Any Angle

EXAMPLE 4 Evaluating Trigonometric Functions

Given $\cos\theta = \frac{4}{5}$ and θ in quadrant IV. Find the value of each of the remaining trigonometric functions of θ.

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a.) *What quadrant are we in ?* IV (x, -y)

b.) *What is x and y and r, and their signs?* $x = 4$ $y = -3$ $r = 5$

c.) *Setup each trig ratio:*

$4^2 + y^2 = 5^2$

$16 + y^2 = 25$

$y^2 = 9$ $y = 3$

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

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

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

Check Point 4

Given $\sin\theta = -\frac{12}{13}$ and θ in quadrant III. Find the value of each of the remaining trigonometric functions of θ.

a.) *What quadrant are we in ?* III (-x, -y)

b.) *What is x and y and r, and their signs?* $x = -5$ $y = -12$ $r = 13$

c.) *Setup each trig ratio:*

$x^2 + (-12)^2 = 13^2$

$x^2 = 25$

$x = 5$

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

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

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

EXAMPLE 4 Evaluating Trigonometric Functions

Given $\tan\theta = -\frac{2}{3}$ and $\cos\theta > 0$, find the value of each of the remaining trigonometric functions of θ.

a.) *What quadrant are we in ?* II or IV

b.) *What is x and y and r, and their signs?* $x = 3 \quad y = -2 \quad r = \sqrt{13}$

c.) *Setup each trig ratio:*

$3^2 + (-2)^2 = r^2$

$13 = r^2$

$\sqrt{13} = r$

$\sin\theta = -\frac{2}{\sqrt{13}} \rightsquigarrow -\frac{2\sqrt{13}}{13} \qquad \csc\theta = -\frac{\sqrt{13}}{2}$

$\cos\theta = \frac{3}{\sqrt{13}} \rightsquigarrow \frac{3\sqrt{13}}{13} \qquad \sec\theta = \frac{\sqrt{13}}{3}$

$\tan\theta = -\frac{2}{3} \qquad \cot\theta = -\frac{3}{2}$

Check Point 4

Given $\csc\theta = -4$ and $\tan\theta > 0$. Find the value of each of the remaining trigonometric functions of θ.

a.) *What quadrant are we in ?* III

b.) *What is x and y and r, and their signs?* $x = -\sqrt{15} \quad y = -1 \quad r = 4$

c.) *Setup each trig ratio:*

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

$x^2 = 15$

$x = \sqrt{15}$

$\sin\theta = -\frac{1}{4} \qquad \csc\theta = -4$

$\cos\theta = -\frac{\sqrt{15}}{4} \qquad \sec\theta = -\frac{4}{\sqrt{15}} \rightsquigarrow -\frac{4\sqrt{15}}{4}$

$\tan\theta = \frac{-1}{-\sqrt{15}} \rightsquigarrow \frac{1\sqrt{15}}{15} \qquad \cot\theta = \sqrt{15}$