

Day 2 - 4.2 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?

$$x = 4 \quad y = -3 \quad r = 5$$

c.) Setup each trig ratio:

$$\sin = \boxed{-\frac{3}{5}} \quad \csc = \boxed{-\frac{5}{3}}$$

$$\cos = \boxed{\frac{4}{5}} \quad \sec = \boxed{\frac{5}{4}}$$

$$\tan = \boxed{-\frac{3}{4}} \quad \cot = \boxed{-\frac{4}{3}}$$

$$\begin{aligned} x^2 + y^2 &= r^2 \\ 4^2 + y^2 &= 5^2 \\ 16 + y^2 &= 25 \\ y^2 &= 9, \quad y = 3 \end{aligned}$$

Check Point 4 $\rightarrow \frac{y}{r}$

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?

$$x = -5, \quad y = -12, \quad r = 13$$

c.) Setup each trig ratio:

$$\sin = \boxed{-\frac{12}{13}} \quad \csc = \boxed{-\frac{13}{12}}$$

$$\cos = \boxed{-\frac{5}{13}} \quad \sec = \boxed{-\frac{13}{5}}$$

$$\tan = \frac{-12}{-5} = \boxed{\frac{12}{5}} \quad \cot = \boxed{\frac{5}{12}}$$

$$\begin{aligned} x^2 + (-12)^2 &= 13^2 \\ x^2 + 144 &= 169 \\ x^2 &= 25 \\ x &= 5 \end{aligned}$$

EXAMPLE $\frac{y}{x} = -\frac{2}{3}$ Evaluating Trigonometric Functions

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

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

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

c.) Setup each trig ratio:

$\sin = -\frac{2}{\sqrt{13}} \cdot \frac{\sqrt{13}}{\sqrt{13}} = \frac{-2\sqrt{13}}{13}$ $\csc = \frac{-\sqrt{13}}{2}$ $(3)^2 + (-2)^2 = r^2$
 $\cos = \frac{3}{\sqrt{13}} \cdot \frac{\sqrt{13}}{\sqrt{13}} = \frac{3\sqrt{13}}{13}$ $\sec = \frac{\sqrt{13}}{3}$ $9 + 4 = r^2$
 $\tan = \frac{-2}{3}$ $\cot = \frac{-3}{2}$ $13 = r^2$

$\frac{r}{-y} = \frac{4}{-1}$
 Given $\csc \theta = -4$ and $\tan \theta > 0 \rightarrow x \text{ pos.}$ Find the value of each of the remaining trigonometric functions of θ .

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

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

c.) Setup each trig ratio:

$\sin = \frac{-1}{4}$ $\csc = -4$ $x^2 + (-1)^2 = 4^2$
 $\cos = \frac{-\sqrt{15}}{4}$ $\sec = -\frac{4}{\sqrt{15}} \cdot \frac{\sqrt{15}}{\sqrt{15}} = \frac{-4\sqrt{15}}{15}$ $x^2 + 1 = 16$
 $\tan = \frac{-1}{-\sqrt{15}} \cdot \frac{\sqrt{15}}{\sqrt{15}} = \frac{\sqrt{15}}{15}$ $\cot = \frac{-\sqrt{15}}{-1} = \sqrt{15}$ $x^2 = 15$
 $ $ $x = \sqrt{15}$