12-3A Trigonometric Functions

previous assignment:
Degrees & Radians WS

evaluate trig. functions for a given point

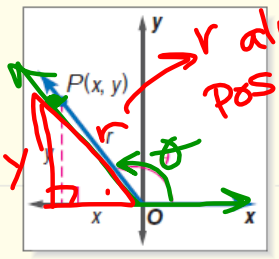
θ'

Key Concept Trigonometric Functions, θ in Standard Position

Let θ be an angle in standard position and let $P(x, y)$ be a point on the terminal side of θ. Using the Pythagorean Theorem, the distance r from the origin to P is given by $r = \sqrt{x^2 + y^2}$. The trigonometric functions of an angle in standard position may be defined as follows.

$\sin\theta = \frac{y}{r}$ $\cos\theta = \frac{x}{r}$ $\tan\theta = \frac{y}{x}, x \neq 0$

$\csc\theta = \frac{r}{y}, y \neq 0$ $\sec\theta = \frac{r}{x}, x \neq 0$ $\cot\theta = \frac{x}{y}, y \neq 0$



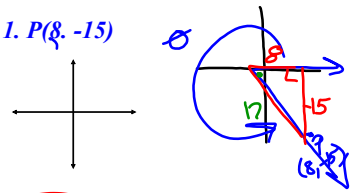
r always pos.

To evaluate trigonometric functions given a point P:

- draw the angle in standard position and label point P on the termina side of the angle.
- find r ***(hypotenuse)*** using the pythagorean theorem.
- use the x, y, and r values to evaluate the trig. functions.
- we are finding the trig. functions for θ, but we are using the ***acute angle*** with the ***x-axis.***

Examples: ***Find the exact values of the 6 trigonometric functions of θ if the terminal side of θ contains the given point P.***

1. P(8, -15)



$8^2+(-15)^2=r^2$

$64+225=r^2$

$\sqrt{289}=\sqrt{r^2}$

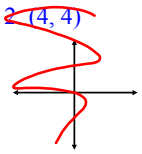
$17=r$

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

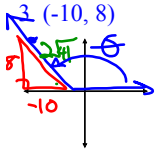
$\cos\theta=\frac{8}{17}$ $\sec\theta=\frac{17}{8}$

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

2. (4, 4)



3. (-10, 8)



$(-10)^2+8^2=r^2$

$100+64=r^2$

$\sqrt{164}=\sqrt{r^2}$

$2\sqrt{41}=r$

$\sin\theta=\frac{8}{2\sqrt{41}}=\frac{4}{\sqrt{41}}=\frac{4\sqrt{41}}{41}$

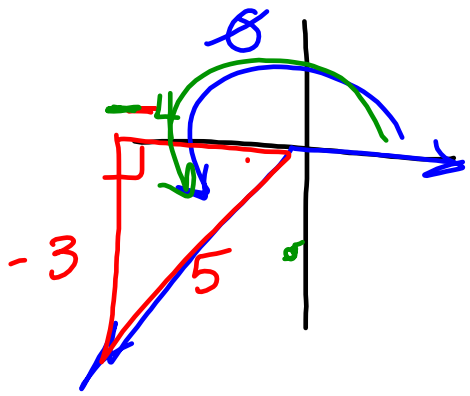
$\cos\theta=\frac{-10}{2\sqrt{41}}=\frac{-5}{\sqrt{41}}=\frac{-5\sqrt{41}}{41}$

$\tan\theta=\frac{8}{-10}=\frac{-4}{5}$

$\csc\theta=\frac{\sqrt{41}}{4}$

$\sec\theta=\frac{-\sqrt{41}}{5}$ $\cot\theta=\frac{-5}{4}$

6. Suppose θ is an angle in standard position whose terminal side is in quadrant III and $\csc\theta = \frac{-5}{3}$. Find the exact values of the remaining five trigonometric functions.



$\csc = \frac{hyp}{opp} = \frac{-5}{3} = \frac{5}{-3}$

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

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

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

Page 811, 1, 2, 12-17
(skip quadrantals) (0, y) skip (x, 0)
Page 812, 37-40

Attachments

Degree & Radians WS Key.notebook