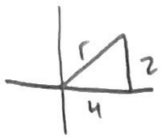
Georgia Gwinnett College
Precalculus

Practice Problems on Trigonometric functions of any angle.

1. A point on the terminal side of angle θ is given. Find the exact value of the indicated trigonometric function of θ:

   (a) (4, 2) Find $\sin\theta$.



$r = \sqrt{4^2+2^2} = \sqrt{20} = 2\sqrt{5}$

$\sin\theta = \frac{y}{r} = \frac{2}{2\sqrt{5}} = \frac{1}{\sqrt{5}} = \frac{\sqrt{5}}{5}$

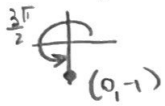
   (b) (-3, -2) Find $\cos\theta$.

$r = \sqrt{2^2+3^2} = \sqrt{4+9} = \sqrt{13}$

$\cos\theta = \frac{x}{r} = \frac{-3}{\sqrt{13}} = -\frac{3\sqrt{13}}{13}$

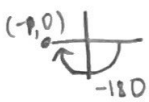
2. Evaluate the trigonometric function of the quadrantal angle:

   (a) $\tan\frac{3\pi}{2} = \frac{y}{x} = \frac{-1}{0} =$ undefined



$x = 0$
$y = -1$

   (b) $\sin -180° = \frac{x}{r} = \frac{-1}{1} = -1$



$x = -1$
$r = 1$

3. Let θ be an angle in standard position. Name the quadrant in which θ lies.

   (a) $\sin\theta > 0, \cos\theta < 0$

II

   (b) $\tan\theta > 0, \sin\theta < 0$

III

   (c) $\cot\theta < 0, \sec\theta < 0$

II

   (d) $\csc\theta < 0, \sec\theta < 0$

III

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4. Find the exact value of the indicated trigonometric function of θ:

(a) $\sin\theta = -\frac{2}{5}$, $\tan\theta > 0$. Find the remaining trig functions of θ.

$\Rightarrow$ III q. $\sin\theta = \frac{-2}{5} = \frac{y}{r}$

$x^2 + y^2 = r^2$
$x^2 + 2^2 = 5^2$
$x^2 + 4 = 25$
$x^2 = 21$
$x = -\sqrt{21}$

$\cos\theta = \frac{x}{r} = \frac{-\sqrt{21}}{5}$
$\sec\theta = \frac{r}{x} = \frac{5}{-\sqrt{21}} = -\frac{5\sqrt{21}}{21}$
$\csc\theta = \frac{r}{y} = \frac{5}{-2} = -\frac{5}{2}$
$\tan\theta = \frac{y}{x} = \frac{-2}{-\sqrt{21}} = \frac{2\sqrt{21}}{21}$
$\cot\theta = \frac{x}{y} = \frac{-\sqrt{21}}{-2} = \frac{\sqrt{21}}{2}$

(b) $\tan\theta = -\frac{2}{7}$, $\cos\theta < 0$. Find the remaining trig functions of θ.

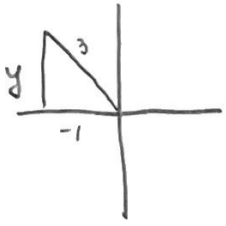
$\Rightarrow$ II q. $\tan\theta = \frac{2}{-7} = \frac{y}{x}$

$x^2 + y^2 = r^2$
$2^2 + 7^2 = r^2$
$4 + 49 = r^2$
$r = \sqrt{53}$

$\sin\theta = \frac{y}{r} = \frac{2}{\sqrt{53}} = \frac{2\sqrt{53}}{53}$
$\csc\theta = \frac{r}{y} = \frac{\sqrt{53}}{2}$
$\cos\theta = \frac{x}{r} = \frac{-7}{\sqrt{53}} = -\frac{7\sqrt{53}}{53}$
$\sec\theta = \frac{r}{x} = \frac{\sqrt{53}}{-7} = -\frac{\sqrt{53}}{7}$
$\cot\theta = \frac{x}{y} = -\frac{7}{2}$

(c) $\sec\theta = -3$, $\tan\theta < 0$. Find the remaining trig functions of θ.

$\Rightarrow$ II q. $\sec\theta = \frac{3}{-1} = \frac{r}{x}$



$1^2 + y^2 = 3^2$
$y^2 = 9 - 1$
$y = \sqrt{8}$
$y = 2\sqrt{2}$

$\cos\theta = \frac{x}{r} = \frac{-1}{3} = -\frac{1}{3}$
$\sin\theta = \frac{y}{r} = \frac{2\sqrt{2}}{3}$
$\csc\theta = \frac{r}{y} = \frac{3}{2\sqrt{2}} = \frac{3\sqrt{2}}{4}$
$\tan\theta = \frac{y}{x} = \frac{2\sqrt{2}}{-1} = -2\sqrt{2}$
$\cot\theta = \frac{x}{y} = \frac{-1}{2\sqrt{2}} = -\frac{\sqrt{2}}{4}$

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