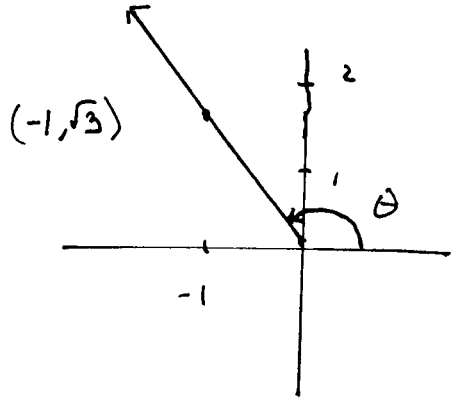
Warm-up question

1.3 p28 26) Sketch an angle θ in standard position so that the terminal ray passes through $(-1, \sqrt{3})$. Find the values of the six trig functions.



$x = -1$

$y = \sqrt{3}$

$r^2 = x^2 + y^2$

$= (-1)^2 + (\sqrt{3})^2$

$= 1 + 3 = 4$

So $r = \sqrt{4} = 2$

$\frac{r^2}{r^2} = \frac{x^2}{r^2} + \frac{y^2}{r^2}$

$1 = (\cos\theta)^2 + (\sin\theta)^2$

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

$\csc\theta = \frac{2}{\sqrt{3}} = \frac{2\sqrt{3}}{3}$ $\quad \sec\theta = -2$ $\quad \cot\theta = -\frac{1}{\sqrt{3}}$

How? $\frac{2}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{2\sqrt{3}}{3}$

1.4 Reciprocal identities

ex: For some angle θ, $\sin\theta = \frac{2}{3}$. What is $\csc\theta$? $\csc\theta = \frac{3}{2}$

ex: For some angle θ, $\cot\theta = -\frac{7}{3}$ What is $\tan\theta$? $-\frac{3}{7}$

slope $= -\frac{3}{7}$

And what quadrants might θ be in?

Answer: 2nd and 4th quadrant

1.4 (cont'd) Pythagorean identities

$$y^2 + x^2 = r^2$$ Now divide by r^2:

$$\frac{y^2}{r^2} + \frac{x^2}{r^2} = \frac{r^2}{r^2}$$

$$\left(\frac{y}{r}\right)^2 + \left(\frac{x}{r}\right)^2 = 1$$

$$(\sin\theta)^2 + (\cos\theta)^2 = 1$$

Notation: $\boxed{\sin^2\theta + \cos^2\theta = 1}$ Pythagorean identity

NOW, $$y^2 + x^2 = r^2$$

$$\frac{y^2}{x^2} + \frac{x^2}{x^2} = \frac{r^2}{x^2}$$

$$\left(\frac{y}{x}\right)^2 + 1 = \left(\frac{r}{x}\right)^2$$

$$(\tan\theta)^2 + 1 = (\sec\theta)^2$$

$$\boxed{\tan^2\theta + 1 = \sec^2\theta}$$

Also $\boxed{1 + \cot^2\theta = \csc^2\theta}$ ← By dividing by y^2.

ex: $10\tan^2\theta + 10 = 10(\tan^2\theta + 1)$

$= 10\sec^2\theta$