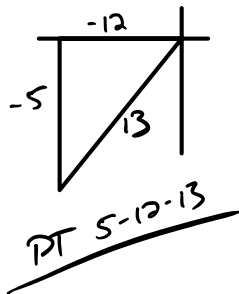


Homework 9.5

The terminal side of an angle, θ , passes through the given ordered pairs below. For each angle, draw and label the reference triangle and find the values of the six trigonometric ratios. Show your work.

1. $(-12, -5)$

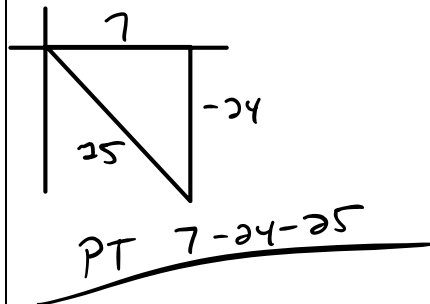


$$\sin \theta = \frac{-5}{13} \quad \csc \theta = \frac{13}{-5}$$

$$\cos \theta = \frac{-12}{13} \quad \sec \theta = \frac{13}{-12}$$

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

2. $(7, -24)$

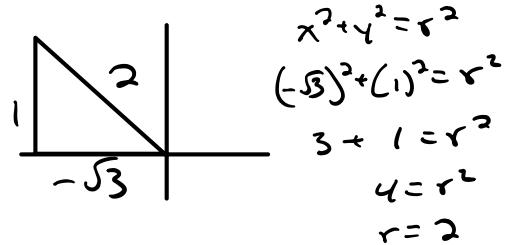


$$\sin \theta = \frac{-24}{25} \quad \csc \theta = \frac{25}{-24}$$

$$\cos \theta = \frac{7}{25} \quad \sec \theta = \frac{25}{7}$$

$$\tan \theta = \frac{-24}{7} \quad \cot \theta = \frac{7}{-24}$$

3. $(-\sqrt{3}, 1)$



$$\sin \theta = \frac{1}{2} \quad \csc \theta = 2$$

$$\cos \theta = \frac{-\sqrt{3}}{2} \quad \sec \theta = \frac{2}{-\sqrt{3}}$$

$$\tan \theta = \frac{-1}{\sqrt{3}} \quad \cot \theta = -\sqrt{3}$$

Given the constraints on the angles below, determine in which quadrant or on which axis the terminal side of the angle lies. If no such angle exists, state so. Completely explain your reasoning.

4. $\sin \theta > 0$ and $\tan \theta < 0$

$$\sin \theta = \frac{y}{r} > 0 \quad \therefore \theta \text{ terminates above } x\text{-axis.}$$

$$\tan \theta = \frac{y}{x} < 0 \quad \therefore \theta \text{ terminates QUAD II or IV}$$

$$\therefore \theta \text{ terminates in QUAD II.}$$

5. $\sec \theta > 0$ and $\cot \theta < 0$

$$\sec \theta = \frac{r}{x} > 0 \quad \therefore \theta \text{ terminates right of } y\text{-axis}$$

$$\cot \theta = \frac{x}{y} < 0 \quad \therefore \theta \text{ terminates QUAD II or IV}$$

$$\therefore \theta \text{ terminates in QUAD III}$$

6. $\sin \theta < 0$ and $\cos \theta > 0$

$$\sin \theta = \frac{y}{r} < 0 \quad \therefore \theta \text{ terminates below } x\text{-axis.}$$

$$\cos \theta = \frac{x}{r} > 0 \quad \therefore \theta \text{ terminates right of } y\text{-axis}$$

$$\therefore \theta \text{ terminates in QUAD IV}$$

7. $\cos \theta > 0$ and $\sec \theta$ is undefined

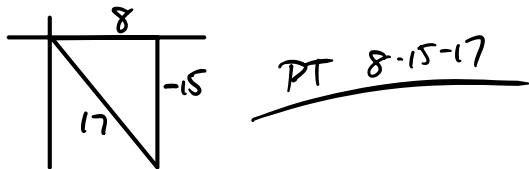
$$\cos \theta = \frac{x}{r} > 0 \quad \therefore \theta \text{ terminates right of } y\text{-axis}$$

$$\sec \theta = \frac{r}{x} = \text{und} \quad \therefore \theta \text{ terminates on } y\text{-axis}$$

$$\therefore \theta \text{ does not exist.}$$

8. If $\tan \theta = -\frac{15}{8}$ and $\sin \theta < 0$, find the exact value of the other five trigonometric ratios. If no such angle θ exists, explain why.

$\tan \theta = \frac{y}{x} = -\frac{15}{8} < 0 \therefore \theta$ terminates in QUAD II or IV
 $\sin \theta = \frac{y}{r} < 0 \therefore \theta$ terminates below X-axis.



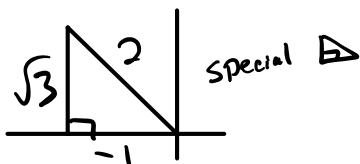
$\sin \theta = \frac{-15}{17}$ $\csc \theta = \frac{17}{-15}$

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

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

9. If $\sec \theta = -2$ and $\sin \theta > 0$, find the exact value of the other five trigonometric ratios. If no such angle θ exists, explain why.

$\sec \theta = \frac{r}{x} = -2 < 0 \therefore \theta$ terminates left of Y-axis
 $\sin \theta = \frac{y}{r} > 0 \therefore \theta$ terminates above X-axis



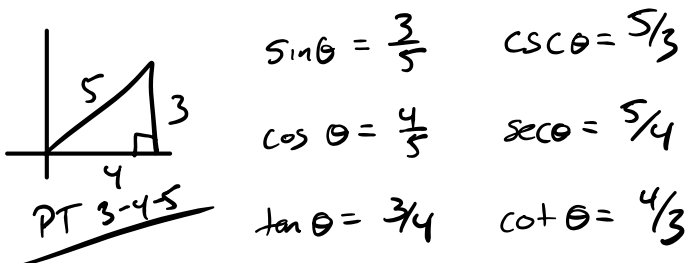
$\sin \theta = \frac{\sqrt{3}}{2}$ $\csc \theta = \frac{2}{\sqrt{3}}$

$\cos \theta = -\frac{1}{2}$ $\sec \theta = -2$

$\tan \theta = -\sqrt{3}$ $\cot \theta = \frac{1}{-\sqrt{3}}$

10. If $\sin \theta = \frac{3}{5}$ and $\sec \theta > 0$, find the exact value of the other five trigonometric ratios. If no such angle θ exists, explain why.

$\sin \theta = \frac{y}{r} = \frac{3}{5} \therefore \theta$ terminates above X-axis
 $\sec \theta = \frac{r}{x} > 0 \therefore \theta$ terminates right of Y-axis



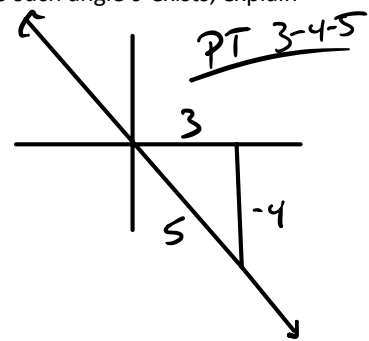
$\sin \theta = \frac{3}{5}$ $\csc \theta = \frac{5}{3}$

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

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

11. If the terminal side of θ is in Quadrant IV and lies on the line $4x + 3y = 0$, find the exact value of the six trigonometric ratios. If no such angle θ exists, explain why.

$4x + 3y = 0$
 $3y = -4x$
 $y = -\frac{4}{3}x$



$\sin \theta = -\frac{4}{5}$ $\csc \theta = \frac{5}{-4}$

$\cos \theta = \frac{3}{5}$ $\sec \theta = \frac{5}{3}$

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

12. If $\cos \theta = -\frac{4}{5}$ and θ terminates in Quadrant IV, find the exact value of the other five trigonometric ratios. If no such angle θ exists, explain why.

If $\cos \theta = -\frac{4}{5}$, then $x = -4$.

In QUAD IV, x is positive.

$\therefore \theta$ does not exist.