

Section 4.2, 4.3, 4.4A Review PreCalc CP

KEY

1) Write an equivalent using cofunctions:

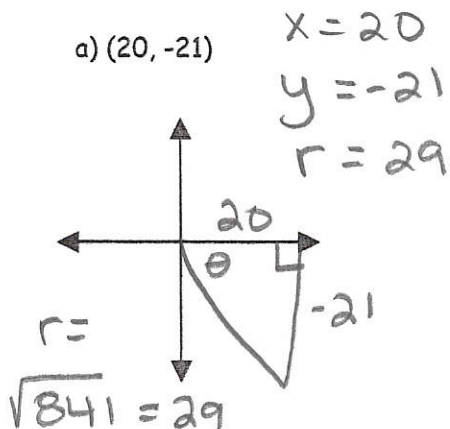
a) $\sin 253^\circ$ ~~_____~~

b) $\csc \frac{\pi}{3}$ ~~_____~~

c) $\tan 40$ ~~_____~~

2) The terminal sided of an angle β in standard position passes through the given point. Sketch the reference triangle. Then find the exact values of the six trigonometric functions.

a) (20, -21)



$$\sin \beta = \frac{y}{r} = \frac{-21}{29}$$

$$\csc \beta = \frac{29}{-21}$$

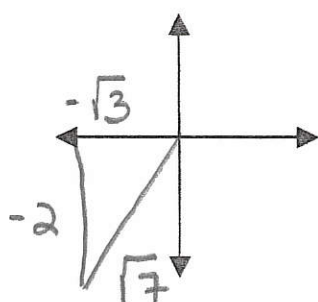
$$\cos \beta = \frac{x}{r} = \frac{20}{29}$$

$$\sec \beta = \frac{29}{20}$$

$$\tan \beta = \frac{y}{x} = \frac{-21}{20}$$

$$\cot \beta = \frac{-20}{21}$$

b) $(-\sqrt{3}, -2)$



$$\sin \beta = \frac{y}{r} = \frac{-2\sqrt{7}}{7}$$

$$\csc \beta = \frac{r}{y} = -\frac{\sqrt{7}}{2}$$

$$\cos \beta = \frac{x}{r} = \frac{-\sqrt{3}}{\sqrt{7}} = -\frac{\sqrt{21}}{7}$$

$$\sec \beta = \frac{r}{x} = -\frac{\sqrt{21}}{3}$$

$$\tan \beta = \frac{y}{x} = \frac{2\sqrt{3}}{3}$$

$$\cot \beta = \frac{x}{y} = \frac{\sqrt{3}}{2}$$

$$\frac{x}{r} = \frac{-\sqrt{3}}{\sqrt{7}} = \frac{-\sqrt{3}\sqrt{7}}{7}$$

3) In what quadrant(s) does α lie under the given conditions.

a) $\sin \alpha$ and $\tan \alpha$ have the same sign I, V

b) $\sin \alpha < 0$ and $\cos \alpha > 0$ IV

c) $\cos \alpha$ and $\csc \alpha$ have opposite signs II, IV

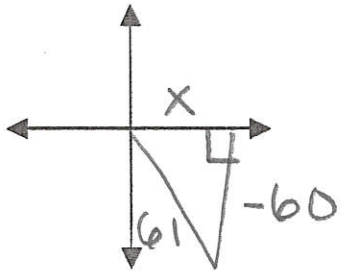
d) $\sec \alpha$ and $\csc \alpha$ have the same sign I, III

4) Find the exact values of the other 5 trigonometric functions for an angle θ in standard position lying in the given quadrant and sketch the reference triangle.

a) $\sin \theta = -\frac{60}{61}$ quadrant IV

$y = -60$
 $r = 61$
 $x = 11$

$r = \sqrt{x^2 + y^2}$
 $r^2 = x^2 + y^2$
 $3721 = x^2 + 3600$
 $121 = x^2$
 $x = \pm \sqrt{121}$
 11
 x pos
 $x = 11$

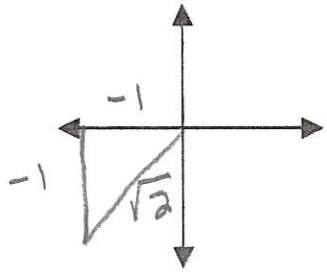


$\frac{x}{r} \cos \theta = \frac{11}{61}$
 $\frac{y}{r} \tan \theta = \frac{-60}{11}$

$\csc \theta = \frac{r}{y} = \frac{61}{-60}$
 $\sec \theta = \frac{r}{x} = \frac{61}{11}$
 $\cot \theta = \frac{x}{y} = \frac{-11}{60}$

b) $\cot \theta = 1$ quadrant III

$\cot \theta = \frac{x}{y} = -1$

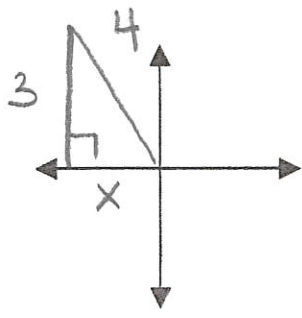


$\sin \theta = \frac{y}{r} = \frac{-1}{\sqrt{2}}$
 $\cos \theta = \frac{x}{r} = \frac{-1}{\sqrt{2}}$
 $\tan \theta = \frac{y}{x} = 1$

$\csc \theta = \frac{r}{y} = \frac{\sqrt{2}}{-1} = -\sqrt{2}$
 $\sec \theta = \frac{r}{x} = \frac{\sqrt{2}}{-1} = -\sqrt{2}$

c) $\csc \theta = \frac{4}{3}$ quadrant II

$\csc \theta = \frac{r}{y} = \frac{4}{3}$



$\sin \theta = \frac{y}{r} = \frac{3}{5}$
 $\cos \theta = \frac{x}{r} = \frac{-4}{5}$
 $\tan \theta = \frac{y}{x} = \frac{3}{-4} = -\frac{3}{4}$

$\sec \theta = \frac{r}{x} = \frac{5}{-4} = -\frac{5}{4}$
 $\cot \theta = \frac{x}{y} = \frac{-4}{3}$

$x^2 + y^2 = r^2$
 $x^2 + 9 = 16$
 $x^2 = 7$
 $x = -\sqrt{7}$
 $y = 3$
 $r = 5$

Review - UNIT CIRCLE:

Evaluate the six trigonometric functions of the real number.

5/6. Sketch and LABEL a first quadrant unit circle

Q1
7. $t = \frac{7\pi}{3} = \frac{6\pi}{3} + \frac{\pi}{3}$

$$\sin(t) = \frac{\sqrt{3}}{2}$$

$$\cos(t) = \frac{1}{2}$$

$$\tan(t) = \sqrt{3}$$

$$\csc(t) = \frac{2\sqrt{3}}{3}$$

$$\sec(t) = 2$$

$$\cot(t) = \frac{\sqrt{3}}{3}$$

Q3
8. $t = -\frac{5\pi}{6}$

$$\sin(t) = -\frac{1}{2}$$

$$\cos(t) = \frac{\sqrt{3}}{2}$$

$$\tan(t) = \frac{\sqrt{3}}{3}$$

$$\csc(t) = -2$$

$$\sec(t) = \frac{2\sqrt{3}}{3}$$

$$\cot(t) = \sqrt{3}$$

Q3
9. $t = -\frac{3\pi}{4}$

$$\sin(t) = -\frac{\sqrt{2}}{2}$$

$$\cos(t) = -\frac{\sqrt{2}}{2}$$

$$\tan(t) = 1$$

$$\csc(t) = -\sqrt{2}$$

$$\sec(t) = -\sqrt{2}$$

$$\cot(t) = 1$$

Evaluate the trigonometric function.

10. $\cos 3\pi$

$$= \cos 2\pi + \cos \pi$$

$$= -1$$

12. $\sin \frac{13\pi}{3} = \frac{6\pi}{3} + \frac{6\pi}{3} + \frac{\pi}{3}$

$$\frac{\sqrt{3}}{2}$$

11. $\sin -9\pi$

$$\sin(-9\pi) = \sin(-\pi) = 0$$

13. $\cos\left(-\frac{14\pi}{3}\right) = \cos\left[\left(-\frac{12\pi}{3}\right) + \left(-\frac{2\pi}{3}\right)\right]$ Q3

$$= -\frac{1}{2}$$

14. $\frac{\tan 11\pi}{6} = \tan \frac{11\pi}{6}$

Q4

$$-\frac{\sqrt{3}}{3}$$

15. $\frac{\sec 17\pi}{2} = \sec \frac{17\pi}{2} = \frac{16\pi}{2} + \frac{\pi}{2}$

$$\sec \frac{\pi}{2} = \frac{r}{x} = \frac{1}{0}$$

 undef

Find the exact value of each. DO NOT USE A CALCULATOR!

1. $\cos \frac{5\pi}{6} = \underline{-\frac{\sqrt{3}}{2}}$

2. $\tan 180^\circ = \underline{0}$

3. $\sin 120^\circ = \underline{\frac{\sqrt{3}}{2}}$

4. $\cot 225^\circ = \underline{1}$

5. $\csc -60^\circ = \underline{-\frac{2\sqrt{3}}{3}}$

6. $\cos \frac{\pi}{2} = \underline{0}$

$\frac{1}{\sin} = 1 \div \frac{\sqrt{3}}{2} = \frac{2}{\sqrt{3}}$

7. $\sec \frac{7\pi}{4} = \underline{\frac{\sqrt{2}}{2}}$

8. $\sin \frac{\pi}{6} = \underline{\frac{1}{2}}$

9. $\csc 240^\circ = \underline{-\frac{2\sqrt{3}}{3}}$

8. $\cot \frac{10\pi}{3} = \underline{\frac{\sqrt{3}}{3}}$

11. $\sin \frac{11\pi}{6} + \cos \frac{7\pi}{4} = \underline{-\frac{1}{2} + \frac{\sqrt{2}}{2} = \frac{-1 + \sqrt{2}}{2}}$

12. $\tan \frac{4\pi}{3} + \sin \pi = \underline{\sqrt{3} + 0 = \sqrt{3}}$

13. $\sec 210^\circ \tan -135^\circ = \underline{-\frac{2\sqrt{3}}{3}}$

14. $5\cot \frac{4\pi}{3} + \sec \pi = \underline{5\left(\frac{\sqrt{3}}{3}\right) + \frac{1}{x} = \frac{5\sqrt{3}}{3} - 1 = \frac{5\sqrt{3} - 3}{3}}$

$\frac{1}{\cos} = \frac{1}{-\frac{\sqrt{3}}{2}} = -\frac{2}{\sqrt{3}}$

$5\left(\frac{\sqrt{3}}{3}\right) + \frac{1}{x}$
 $\frac{5\sqrt{3}}{3} - 1 = \frac{5\sqrt{3} - 3}{3}$