

I. Find two coterminal angles, one positive and one negative for each of the following.

1. 225°

$585^\circ, -135^\circ$

2. 750°

$390^\circ, 30^\circ, -330^\circ$

3. -60°

$-420^\circ, 300^\circ$

4. $-\pi$

$-3\pi, \pi$

5. $\pi/4$

$\frac{9\pi}{4}, -\frac{7\pi}{4}$

6. $5\pi/6$

$\frac{17\pi}{6}, -\frac{11\pi}{6}$

II. Evaluate the following trigonometric expressions.

7. $\sin(225^\circ)$

$-\frac{\sqrt{2}}{2}$

8. $\csc(750^\circ)$

$\csc(30^\circ)$
 $= \frac{1}{\sin 30^\circ} = 2$

9. $\cot(-60^\circ)$

$\frac{1}{\tan(-30^\circ)} = -\frac{1}{\frac{1}{\sqrt{3}}} = -\sqrt{3}$

10. $\tan(\pi/2)$

undef

11. $\cos(7\pi/4)$

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

12. $\sec(-\pi/6)$

$\frac{1}{\cos(\pi/6)} = \frac{2}{\frac{\sqrt{3}}{2}} = \frac{2\sqrt{3}}{3}$

III. Solve the following trigonometric equations. List answers in both degrees and radians.

$0^\circ \leq \theta < 360^\circ$ and $0 \leq \theta < 2\pi$.

13. $\tan(\theta) = 1$

$45^\circ, \pi/4$

$225^\circ, 5\pi/4$

14. $\sin(\theta) = \frac{-1}{2}$

$330^\circ, 11\pi/6$

$210^\circ, 7\pi/6$

15. $\cos(\theta) = \frac{1}{2}$

$60^\circ, \pi/3$

$300^\circ, 5\pi/3$

16. $\cot(\theta) = -\sqrt{3}$

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

OR
 $(-\frac{\sqrt{3}}{2}, \frac{1}{2})$
 $(\frac{\sqrt{3}}{2}, -\frac{1}{2})$

$150^\circ, 5\pi/6$
 $330^\circ, 11\pi/6$

17. $\sec(\theta) = \frac{2\sqrt{3}}{3}$

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

$\theta = 30^\circ, \pi/6$

$330^\circ, 11\pi/6$

18. $\csc(\theta) = -2$

$\sin(\theta) = -1/2$

$\theta = 330^\circ, 11\pi/6$

$210^\circ, 7\pi/6$

IV. Using a calculator, solve for the angle, θ , where $0^\circ \leq \theta < 360^\circ$. Round answers to the nearest hundredth.

19. $\sin \theta = 0.3907$

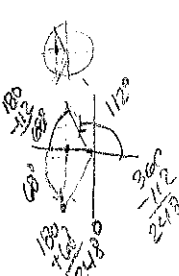
$\theta = 23.00$

$= 157.00$

20. $\cos \theta = -0.3746$

$\theta = 112^\circ$

$= 248^\circ$



21. $\tan \theta = 0.3640$

$\theta = 20.00^\circ$

$= 200^\circ$

22. $\sec \theta = 1.0154$

$\cos \theta = \frac{1}{1.0154}$

$\theta = \cos^{-1}(1/1.0154)$

$\theta = 10^\circ$

$\theta = 350^\circ$

23. $\csc \theta = 4.1336$

$\sin \theta = \frac{1}{4.1336}$

$\theta = 14^\circ$

$\theta = 166^\circ$

24. $\cot \theta = -0.1405$

$\tan \theta = (-1/0.1405)$

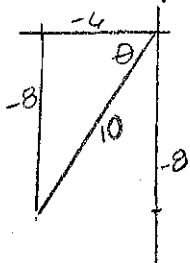
$\theta = 278^\circ$

$= 98^\circ$



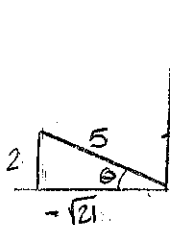
V. Solve for all six trig functions of θ with the given characteristics.

19. An endpoint on the terminal side is $(-6, -8)$.



$$\begin{aligned} \sin\theta &= -4/5 \\ \cos\theta &= -3/5 \\ \tan\theta &= +4/3 \\ \csc\theta &= -5/4 \\ \sec\theta &= -5/3 \\ \cot\theta &= 3/4 \end{aligned}$$

20. θ is in Quadrant II and $\sin\theta = \frac{2}{5}$.



$$\begin{aligned} \sin\theta &= 2/5 \\ \cos\theta &= -\sqrt{21}/5 \\ \tan\theta &= -2\sqrt{21}/21 \\ \csc\theta &= 5/2 \\ \sec\theta &= -5\sqrt{21}/21 \\ \cot\theta &= -\sqrt{21}/2 \end{aligned}$$

VI. Free Response Questions.

21. Define a reference angle.

Distance to closest x-axis

22. Identify the angles on the unit circle with the same reference angles.

- $\pi/6, 5\pi/6, 7\pi/6, 11\pi/6$
- $\pi/4, 3\pi/4, 5\pi/4, 7\pi/4$

- $\pi/3, 2\pi/3, 4\pi/3, 5\pi/3$

23. Identify which trig functions are positive in each quadrant.

- Q1 - all
- Q2 - sin
- Q3 - tan
- Q4 - cos

24. List the domains and ranges:

| | Sine | Cosine | Arcsine | Arccosine | Arctangent |
|--------|--------------|--------------|-------------------|------------|-------------------|
| Domain | \mathbb{R} | \mathbb{R} | $[-1, 1]$ | $[-1, 1]$ | \mathbb{R} |
| Range | $[-1, 1]$ | $[-1, 1]$ | $[-\pi/2, \pi/2]$ | $[0, \pi]$ | $(-\pi/2, \pi/2)$ |

VII. Simplify the following inverse trig expressions.

25. $\arcsin 1$

$$\sin\theta = 1$$

$$\boxed{\pi/2}$$

26. $\arcsin 4$

$$\sin\theta = 4$$

Not Possible

27. $\arccos \frac{\sqrt{2}}{2}$

$$\cos\theta = \frac{\sqrt{2}}{2}$$

$$\boxed{\pi/4}$$

28. $\arccos\left(-\frac{\sqrt{3}}{2}\right)$

$$\cos\theta = -\sqrt{3}/2$$

$$\boxed{5\pi/6}$$

29. $\cos\left[\arccos\left(-\frac{1}{3}\right)\right]$

$$\cos\theta = -1/3$$

$$\boxed{-1/3}$$

30. $\arcsin\left[\sin\frac{7\pi}{6}\right]$

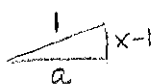
$$\arcsin(-1/2)$$

$$\boxed{-\pi/6}$$

31. $\sec[\arcsin(x-1)]$

$$\sin\theta = \frac{x-1}{1} = \frac{a}{h}$$

$$\begin{aligned} a^2 + (x-1)^2 &= 1^2 \\ a^2 + x^2 - 2x + 1 &= 1 \\ a^2 &= 1 - x^2 + 2x - 1 \\ a &= \sqrt{2x - x^2} \end{aligned}$$



$$\boxed{\sec\theta = \frac{h}{a} = \frac{1}{\sqrt{2x-x^2}}}$$