

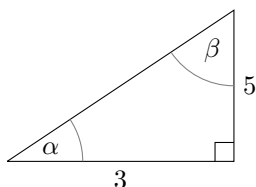
Trigonometry Problem Set

Attempt the following problems *without using a calculator or notes*.

1. Without the help of a calculator or notes, find the following values:

- | | | |
|---------------------|--------------------|---|
| (a) $\sin(\pi/3)$ | (c) $\cot(\pi/2)$ | (e) $\tan(5\pi/3)$ |
| (b) $\csc(-5\pi/6)$ | (d) $\cos(9\pi/4)$ | (f) $\sin^3(5\pi/4)(\sec^2(\pi/3) - \csc^2(\pi/3))$ |

2. Given the following right triangle:



- (a) Find the length of the missing side
 (b) Find $\cot(\alpha)$
 (c) Find $\sec(\beta)$

3. If $\cos(\theta) = \frac{1}{5}$, and $\theta \in [0, \frac{\pi}{2}]$, what is the value of:

- (a) $\sin(\theta)$ (b) $\sec(\theta)$ (c) $\tan(\theta)$

4. Use trigonometric identities to simplify as much as possible:

- | | | |
|---------------------------------|---|--|
| (a) $\cot(x) \sec(x)$ | (c) $\frac{1 - \sin^2(x)}{1 - \cos^2(x)}$ | (e) $\frac{\sec(\theta) \sin^2(\theta)}{1 + \sec(\theta)}$ |
| (b) $\tan(\theta) \cos(\theta)$ | (d) $\cot(y) \tan(y)$ | |

5. Solve for x over the specified interval:

- | | |
|--|--|
| (a) $2 \cos(x) + 2 = 1$, on $[0, 2\pi)$ | (e) $6 \csc(x - \frac{\pi}{3}) = 12$, on $[-\pi/2, \pi/2]$ |
| (b) $6 \sin(x) = \sqrt{18}$, on $[0, 2\pi)$ | (f) $\sin^2(x) = \frac{1}{2}$, on $[0, 2\pi)$ |
| (c) $1 + \sin(x) = 1 - \cos(x)$, on $[0, 2\pi)$ | (g) $\sin^2(x) - 2 \cos(x) = \cos^2(x) - \cos(x)$, on $[0, 2\pi)$ |
| (d) $\tan(3x) = \sqrt{3}$, on $[0, \pi]$ | |

Solutions

- | | | |
|--|--------------------------|--|
| 1. (a) $\frac{3}{2}$ | (c) 0 | (e) $\frac{1}{3}$ or $\frac{\sqrt{3}}{3}$ |
| (b) -2 | (d) $\frac{\sqrt{2}}{2}$ | (f) $-\frac{2\sqrt{2}}{3}$ |
| 2. (a) $\sqrt{34}$ | (b) $\frac{3}{5}$ | (c) $\frac{\sqrt{34}}{5}$ |
| 3. (a) $\frac{2\sqrt{6}}{5}$ (simplified from $\sqrt{\frac{24}{25}}$) | (b) 5 | (c) $2\sqrt{6}$ (simplified from $\sqrt{24}$) |
| 4. (a) $\csc(x)$ | (c) $\cot^2(x)$ | (e) $1 - \cos(\theta)$ |
| (b) $\sin(\theta)$ | (d) 1 | |

5. (a) $x = \frac{2\pi}{3}, \frac{4\pi}{3}$
(b) $x = \frac{\pi}{4}, \frac{3\pi}{4}$
(c) $x = \frac{3\pi}{4}, \frac{7\pi}{4}$
(d) $3x = \frac{\pi}{3}, \frac{4\pi}{3}, \frac{7\pi}{3}, \frac{10\pi}{3}, \dots$ so $x = \frac{\pi}{9}, \frac{4\pi}{9}, \frac{7\pi}{9}$
are the solutions within $[0, \pi]$.
- (e) $x = \frac{\pi}{2}, \frac{7\pi}{6}$
(f) $x = \frac{\pi}{4}, \frac{3\pi}{4}, \frac{5\pi}{4}, \frac{7\pi}{4}$
(g) $x = \frac{\pi}{3}, \frac{5\pi}{3}, \pi$