

PRECALCULUS PROBLEM SESSION #9 SOLUTIONS

Trigonometric Functions and the Unit Circle

1. Tangent, cotangent, secant, and cosecant, since all four involve fractions with either sine or cosine in the denominator; and since sine and cosine can take on the value of 0; the four functions mentioned above have vertical asymptotes.
 2. Sine → Odd Cosine → Even Tangent → Odd
Cosecant → Odd Secant → Even Cotangent → Odd
- $$\frac{\sqrt{15}}{8} \approx 0.484123$$
- 3.
 4. (a) $\frac{\pi}{3}$ (b) $\frac{\pi}{6}$
 5. (a) $\sqrt{2}$ (b) $\sqrt{2}$ (c) 1 (d) -1
 6. (a) $-\frac{\sqrt{2}}{2}$ (b) 0
 7. No, we would also have to know what quadrant the angle is in, or the sign of its sine or cosine.

Right Triangle Trigonometry

1. $\sin \theta = \frac{12}{13}$, $\cos \theta = \frac{5}{13}$, $\tan \theta = \frac{12}{5}$, $\csc \theta = \frac{13}{12}$, $\sec \theta = \frac{13}{5}$, $\cot \theta = \frac{5}{12}$;
The two triangles are similar, which implies the two angles are equal
 2. The ramp will be approximately 23.18 feet long.
 3. The driver's increase in altitude was approximately 436 feet.
4. (a) $\frac{\sqrt{3}}{3}$ (b) $\sqrt{2}$ (c) $\frac{\sqrt{3}}{3}$
 5. $\cos 71^\circ$
 6. $a \approx 18$ cm
 7. The tree's height is approximately 29 feet.

PRECALCULUS PROBLEM SESSION #9 SOLUTIONS

Trigonometric Functions of Any Angle

$$\sin \theta = \frac{5}{13}$$

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

$$\tan \theta = -\frac{5}{12}$$

$$\csc \theta = \frac{13}{5}$$

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

$$\cot \theta = -\frac{12}{5}$$

$$\sin \theta = -\frac{3\sqrt{10}}{10}$$

$$\cos \theta = -\frac{\sqrt{10}}{10}$$

$$\tan \theta = 3$$

$$\csc \theta = -\frac{\sqrt{10}}{3}$$

$$\sec \theta = -\sqrt{10}$$

$$\cot \theta = \frac{1}{3}$$

1. (a) (b)

2. (a) 0 (b) undefined $\frac{5}{12}$

3. θ lies in quadrant IV.

$$\cos \theta = -\frac{5}{13}$$

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

$$\csc \theta = -\frac{13}{12}$$

$$\sec \theta = -\frac{13}{5}$$

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

$$\sin \theta = \frac{\sqrt{10}}{10}$$

$$\cos \theta = -\frac{3\sqrt{10}}{10}$$

$$\csc \theta = \sqrt{10}$$

$$\sec \theta = -\frac{\sqrt{10}}{3}$$

$$\cot \theta = -3$$

4. (a) (b)

5. (a) 10° (b) $\frac{\pi}{4}$

6. (a) $-\frac{\sqrt{3}}{2}$ (b) $-\frac{\sqrt{2}}{2}$ (c) -1 (d) undefined