

### 5.3: (Trigonometric Functions of Angles)

If  $\cot \theta = \frac{1}{2}, \pi < \theta < \frac{3\pi}{2}$ , then  $\sin \theta + \cos \theta =$

(a)  $-\frac{3}{\sqrt{5}}$

(b) 3

(c)  $\frac{-1}{\sqrt{5}}$

(d)  $\frac{3}{\sqrt{5}}$

(e)  $\frac{1}{\sqrt{5}}$

If  $\tan x = \frac{12}{5}$  for all  $x$  is in the third quadrant, then  $\cos x =$

(a)  $-\frac{5}{13}$

(b)  $\frac{5}{13}$

(c)  $-\frac{12}{13}$

(d)  $\frac{12}{13}$

(e)  $\frac{13}{5}$

If  $\cos \theta = -\frac{1}{2}$  and  $\sin \theta > 0$ , then  $\cot \theta + \csc \theta =$

A)  $\frac{\sqrt{3}}{3}$

B)  $\frac{1}{2}$

C)  $-\frac{\sqrt{3}}{2}$

D)  $-\sqrt{3}$

E)  $\sqrt{3}$

If  $\sec \theta = -5$  and  $\sin \theta > 0$ , then  $\tan \theta - \sin \theta =$

A)  $\frac{8\sqrt{6}}{5}$

B)  $12\sqrt{6}$

C)  $-\frac{12\sqrt{6}}{5}$

D)  $-2\sqrt{6}$

E)  $-\frac{8\sqrt{6}}{5}$

If  $\theta$  is in quadrant IV and  $\sec \theta = \frac{x+4}{x}$ , where  $x > 0$ , then  $\tan \theta =$

A)  $-\frac{2\sqrt{2x+4}}{x}$

B)  $-\frac{\sqrt{2x+4}}{2x}$

C)  $\frac{2\sqrt{x+1}}{x}$

D)  $-\frac{4\sqrt{x+4}}{x}$

E)  $\frac{4\sqrt{x+4}}{x}$

If  $x$  is in the third quadrant, then  $\cot x$  in terms of  $\sin x$  is

(a)  $-\frac{\sqrt{1-\sin^2 x}}{\sin x}$

(b)  $\frac{\sqrt{1-\sin^2 x}}{\sin x}$

(c)  $-\frac{\sin x}{\sqrt{1+\sin^2 x}}$

(d)  $\frac{\sin x}{\sqrt{1+\sin^2 x}}$

(e)  $-\frac{\sqrt{1-\sin x}}{\sin x}$

If  $x$  is in the third quadrant, then  $\cot x$  in terms of  $\sec x$  is

A)  $\frac{\sqrt{\sec^2 x - 1}}{\sec^2 x - 1}$

B)  $-\frac{\sqrt{\sec^2 x - 1}}{\sec^2 x - 1}$

C)  $-\frac{\sqrt{\sec^2 x + 1}}{\sec^2 x - 1}$

D)  $\frac{\sqrt{\sec^2 x - 1}}{\sec^2 x + 1}$

E)  $-\frac{1}{\sec^2 x - 1}$

If  $\csc \theta = \frac{x+1}{x}$ ,  $x > 0$ , then  $\cot \theta =$

A)  $\frac{\sqrt{1+2x}}{x}$

B)  $\frac{\sqrt{2x-1}}{x}$

C)  $\frac{\sqrt{x^2+2x}}{x}$

D)  $\frac{\sqrt{2x^2+2x+1}}{x}$

E)  $\frac{1}{x}$

If  $\cot \theta = u$  and  $\theta$  is in the third quadrant, then  $\cot \theta \sec \theta =$

A)  $-\sqrt{1+u^2}$

B)  $\sqrt{1+u^2}$

C)  $\sqrt{1-u^2}$

D)  $-\sqrt{1-u^2}$

E)  $\sqrt{u^2-1}$

If  $\cot \theta = m$ , where  $\pi < \theta < \frac{3\pi}{2}$ , then  $\cos \theta$  is equal to

A)  $-\frac{m\sqrt{1+m^2}}{1+m^2}$

B)  $-\frac{m\sqrt{1-m^2}}{1-m^2}$

C)  $\frac{-\sqrt{1-m^2}}{1-m^2}$

D)  $\frac{-\sqrt{1+m^2}}{1+m^2}$

E)  $\sqrt{1-m^2}$

If  $\cos \theta = -\frac{2}{3}$ ,  $\sin \theta < 0$ , then  $\csc \theta + \tan \theta$

A)  $-\frac{\sqrt{5}}{10}$

B)  $\frac{11\sqrt{5}}{10}$

C)  $-\frac{\sqrt{13}}{10}$

D)  $\frac{3\sqrt{5}}{10}$

E)  $-\frac{7\sqrt{5}}{10}$

If  $\tan \theta = \frac{3}{4}$ , where  $\theta$  is in the third quadrant, then  $\csc \theta =$

A)  $-\frac{5}{3}$

B)  $\frac{5}{3}$

C)  $-\frac{13}{5}$

D)  $-\frac{5}{4}$

E)  $\frac{5}{4}$

Which one of the following statements is possible?

A)  $\tan \theta = -\frac{\sqrt{3}}{2}$  and  $\sec \theta = \frac{\sqrt{7}}{2}$

B)  $\sin \theta = \frac{\pi}{2}$

C)  $\csc \theta = -\frac{1}{2}$  and  $\sin \theta = -2$

D)  $\cos \theta = -\frac{3}{2}$  and  $\sec \theta = -\frac{2}{3}$

E)  $\sec \theta = 0$

If  $\cot \theta = \frac{1}{2}$  where  $\pi < \theta < \frac{3\pi}{2}$ , then  $\sin \theta - \cos \theta =$

A)  $-\frac{\sqrt{5}}{5}$

B)  $-\frac{2\sqrt{5}}{5}$

C)  $\frac{3\sqrt{5}}{5}$

D)  $\frac{2\sqrt{5}}{5}$

E)  $-\frac{3\sqrt{5}}{5}$

Which one of the following statements is FALSE for any angle  $\alpha$  in the domain of the functions?

A)  $\sin \alpha + \cos \alpha = 1$

B)  $-1 \leq \sin \alpha \leq 1$

C)  $1 \leq |\sec \alpha|$

D)  $1 \leq |\csc \alpha|$

E)  $-\infty < \tan \alpha < \infty$

If  $\tan \theta = -\frac{5}{3}$  and  $\theta$  is in the second quadrant, then  $\frac{\csc \theta - \cot \theta}{\cos \theta} =$

A)  $-\frac{34+3\sqrt{34}}{15}$

B)  $\frac{3+\sqrt{34}}{15}$

C)  $-\frac{\sqrt{34}}{15}$

D)  $\frac{3\sqrt{34}-34}{34}$

E)  $\frac{34}{9} - \frac{\sqrt{34}}{5}$



The exact value of  $-\tan (780^\circ)\sin (570^\circ) - \sec (-585^\circ)$  is

A)  $\frac{\sqrt{3}+2\sqrt{2}}{2}$

B)  $\frac{\sqrt{3}-2\sqrt{2}}{2}$

C)  $\frac{2\sqrt{3}-3\sqrt{2}}{2}$

D)  $\frac{\sqrt{3}-\sqrt{2}}{2}$

E)  $\frac{\sqrt{3}+\sqrt{2}}{2}$

Which one of the following statements is TRUE?

A) If  $\tan \theta = \sqrt{3}$  and  $\theta$  is in Quadrant III, then  $\cos \theta = -\frac{1}{2}$ .

B) If  $\cot \theta = 2$ , then  $\sin \theta = 2$  and  $\cos \theta = 1$ .

C) If  $\sec \theta > 0$  and  $\csc \theta > 0$ , then  $\theta$  lies in Quadrant II.

D) If  $90^\circ < \theta < 180^\circ$ , then  $\sin (2\theta)$  is positive.

E) If  $\sec \theta = \frac{10}{3}$ , then  $\sin \theta = \frac{3}{10}$ .

If  $\cot \theta = \frac{2}{\sqrt{5}}$ ,  $\sec \theta < 0$ , then  $\sin \theta \cos \theta =$

A)  $\frac{2\sqrt{5}}{9}$

B)  $2\sqrt{5}$

C)  $-\frac{2\sqrt{5}}{9}$

D)  $\frac{\sqrt{5}}{3}$

E)  $-\frac{\sqrt{5}}{9}$

$\sec \left( -\frac{23\pi}{6} \right) \cot \left( \frac{16\pi}{3} \right) =$

A)  $\frac{2}{3}$

B)  $-\frac{2}{3}$

C) 2

D)  $-\frac{3}{2}$

E) -3

The exact value of  $\tan\left(-\frac{7\pi}{6}\right) + \sec\left(-\frac{\pi}{6}\right)$  is equal to

(a)  $\frac{\sqrt{3}}{3}$

(b)  $-\frac{\sqrt{3}}{3}$

(c)  $-\frac{3\sqrt{3}}{2}$

(d)  $-\frac{2\sqrt{3}}{3}$

(e)  $\frac{\sqrt{3}}{2}$

The value of  $\cot\left(-\frac{17\pi}{3}\right) + \sin\left(\frac{11\pi}{6}\right) =$

A)  $\frac{2\sqrt{3}-3}{6}$

B)  $\frac{2\sqrt{3}+1}{3}$

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

D)  $\frac{2\sqrt{3}-1}{6}$

E)  $\frac{\sqrt{3}+2}{2}$

$$\tan (570^\circ) + \csc (-1020^\circ) =$$

A)  $\sqrt{3}$

B)  $-\sqrt{3}$

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

D)  $\frac{\sqrt{3}}{3}$

E)  $\sqrt{3} + 2$

$$\text{If } u = \sin 780^\circ \text{ and } v = \cot (-950^\circ) + \tan 220^\circ, \text{ then } 4(u^2 + v) =$$

A) 3

B)  $\sqrt{3}$

C)  $3 + 4\cot 40^\circ$

D)  $\sqrt{3} + 4\tan 40^\circ$

E) -1

If  $\tan \theta = -\frac{2\sqrt{5}}{5}$  and  $\sec \theta = -\frac{3\sqrt{5}}{5}$  then,  $12\csc \theta =$

A) 18

B) 8

C) -18

D) -8

E)  $-3\sqrt{5}$

$\sqrt{3}\tan(750^\circ) + 2\sec(-300^\circ) =$

A) 5

B) -3

C) 7

D) -1

E) 2

If  $\cos 160^\circ = A$ , then  $\cos 340^\circ + \sec 200^\circ$  equals to

A)  $\frac{1-A^2}{A}$

B)  $\frac{1+A^2}{A}$

C)  $\frac{A^2-1}{A}$

D)  $\frac{1}{A}$

E)  $A^2 + 1$

The exact value of  $\sec(-480^\circ) - \cot \frac{3\pi}{4}$  is

A) - 1

B) -3

C)  $\frac{3-2\sqrt{3}}{3}$

D) 3

E)  $\frac{3+2\sqrt{3}}{3}$

$$\sec \frac{25\pi}{6} - \tan (-510^\circ) =$$

A)  $\frac{\sqrt{3}}{3}$

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

C)  $\sqrt{3}$

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

E)  $-\frac{2\sqrt{3}}{3}$

$$\tan \left( \frac{23\pi}{6} \right) + \csc \left( \frac{11\pi}{6} \right) =$$

A)  $\frac{-\sqrt{3}-6}{3}$

B)  $\frac{-\sqrt{3}+6}{3}$

C)  $\frac{-2\sqrt{3}-3}{6}$

D)  $\frac{\sqrt{3}+2}{3}$

E)  $\frac{\sqrt{3}-2}{3}$

If  $\alpha$  is the reference angle of  $-30^\circ$  and  $\beta$  is the smallest positive coterminal angle of  $-670^\circ$ , then  $\alpha + \beta =$

A)  $80^\circ$

B)  $380^\circ$

C)  $110^\circ$

D)  $200^\circ$

E)  $20^\circ$

If  $\alpha = 475^\circ$  and  $\beta = -\frac{11\pi}{6}$  are two angles in standard position,  $2\alpha + \beta$  is in the

A) third quadrant

B) first quadrant

C) second quadrant

D) fourth quadrant

E) quadrantal angle



If  $\pi < \theta < \frac{3\pi}{2}$  and  $\cot \theta = \frac{3\sqrt{7}}{7}$ , then  $\cos \theta =$

A)  $-\frac{3}{4}$

B)  $-\frac{4}{3}$

C)  $\frac{\sqrt{7}}{4}$

D)  $-\frac{\sqrt{7}}{3}$

E)  $\frac{3}{4}$

The exact value of  $\tan (675^\circ)\cos (-240^\circ) - \csc (495^\circ)$  is

A)  $\frac{1-2\sqrt{2}}{2}$

B)  $\frac{1+2\sqrt{2}}{2}$

C)  $\frac{-1-2\sqrt{2}}{2}$

D)  $\frac{1-\sqrt{2}}{2}$

E)  $\frac{1+\sqrt{2}}{2}$

$$\tan\left(-\frac{5\pi}{3}\right) + \csc\left(\frac{23\pi}{6}\right) =$$

A)  $\sqrt{3} - 2$

B)  $\sqrt{3} + 2$

C)  $2 - \sqrt{3}$

D)  $\frac{\sqrt{3}+2}{2}$

E)  $\frac{\sqrt{3}-2}{2}$

The exact value of  $\sec\left(-\frac{19\pi}{4}\right) \cdot \tan\left(\frac{17\pi}{3}\right) + \csc\left(\frac{11\pi}{6}\right)$  is equal to

A)  $\sqrt{6} - 2$

B)  $\frac{\sqrt{6}-6}{3}$

C)  $\frac{2\sqrt{6}-1}{2}$

D)  $-\sqrt{6} + 2$

E)  $-\sqrt{6} - 2$

Which one of the following statements is TRUE for  $-90^\circ < \theta < 90^\circ$ .

A)  $\sec(\theta - 180^\circ)$  is negative

B)  $\cos \frac{\theta}{2}$  is negative

C)  $\cos(\theta + 180^\circ)$  is positive

D)  $\sin(\theta - 90^\circ)$  is positive

E)  $\sec(-\theta)$  is negative

$\sec(480^\circ) =$

A)  $-\frac{2\sqrt{3}}{3}$

B) 2

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

D) -2

E) -1

$$4\sin(-870^\circ) + \tan 143^\circ + \cot 53^\circ =$$

A) -2

B) 2

C)  $2\sqrt{3}$

D)  $-2\sqrt{3}$

E)  $2\sqrt{2}$

$$4\sin(-510^\circ)\cos 300^\circ + \cot 199^\circ - \tan 251^\circ =$$

A) -1

B) 1

C)  $1 - 2\sqrt{3}$

D)  $-1 + 2\sqrt{3}$

E)  $-1 - 2\sqrt{3}$

Which one of the following statements is TRUE?

A)  $\sec (-89)^{\circ} > 0$

B)  $\cot (-100)^{\circ} < 0$

C)  $\cos 178^{\circ} > 0$

D)  $\tan 340^{\circ} > 0$

E)  $\sin 370^{\circ} < 0$

Which one of the following statements is FALSE?

A)  $(\sin \theta + \cos \theta)^2 = 1$  for all angles  $\theta$ .

B) If  $90^{\circ} < \theta < 180^{\circ}$ , then  $\cot \left(\frac{\theta}{2}\right)$  is positive

C) If  $\sec \theta < 0$  and  $\csc \theta < 0$ , then  $\theta$  lies in Quadrant III.

D) If  $\tan \theta < 0$  and  $\cot \theta < 0$ , then  $\theta$  lies in Quadrant II or IV.

E) If  $\csc \theta = 2$  and  $\theta$  in quadrant II, then  $\cos \theta = -\frac{\sqrt{3}}{2}$

$$\cos\left(\frac{7\pi}{4}\right)\tan\left(\frac{4\pi}{3}\right) + \cos\left(\frac{7\pi}{6}\right) =$$

A)  $\frac{\sqrt{6}-\sqrt{3}}{2}$

B)  $\frac{\sqrt{6}+\sqrt{3}}{2}$

C)  $\frac{\sqrt{2}+\sqrt{3}}{2}$

D)  $\frac{\sqrt{2}-\sqrt{3}}{2}$

E)  $\frac{\sqrt{6}-\sqrt{3}}{4}$

The exact value of  $\sec(-480^\circ) + \csc\left(\frac{71\pi}{6}\right)$  is

A) -4

B)  $-\frac{1}{2}$

C) -2

D)  $-\frac{1}{4}$

E) -3

The value of  $\sin 150^\circ + \tan \frac{5\pi}{4} + \sec 300^\circ$  is

A)  $\frac{7}{2}$

B)  $\frac{3}{2}$

C)  $\frac{5-\sqrt{2}}{2}$

D)  $\frac{1}{2}$

The exact value of  $\sin (-210^\circ) + \cot (735^\circ) + \tan (285^\circ)$  is

A)  $\frac{1}{2}$

B)  $\frac{\sqrt{2}}{2}$

C)  $-\frac{\sqrt{3}}{2}$

D)  $-\frac{1}{2}$

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

If  $2\sin \theta = -3\cos \theta$ ,  $\frac{3\pi}{2} < \theta < 2\pi$ , then  $\sin \theta - \cos \theta =$

A)  $-\frac{5}{\sqrt{13}}$

B)  $\frac{5}{\sqrt{13}}$

C)  $-\frac{1}{\sqrt{13}}$

D)  $\frac{1}{\sqrt{13}}$

E) -1

The value of  $\cos (-510^\circ)\csc (300^\circ) + \tan \left(-\frac{9\pi}{4}\right)$  is

(a) 0

(b)  $\sqrt{3} - 1$

(c) -2

(d)  $\frac{4}{3}$

(e)  $\frac{3}{4}$



$$4\sin(-510^\circ)\cos 300^\circ + \cot 199^\circ - \tan 251^\circ =$$

A) -1

B) 1

C)  $1 - 2\sqrt{3}$

D)  $-1 + 2\sqrt{3}$

E)  $-1 - 2\sqrt{3}$

$$\text{If } \tan 20^\circ = a, \text{ then } \tan 160^\circ + \tan(-380^\circ) =$$

A)  $-2a$

B) 0

C)  $2a$

D)  $\sqrt{1 + a^2}$

E)  $\frac{1-a}{a}$

If  $\tan 324^\circ = x$ , then  $\csc 36^\circ =$

A)  $-\frac{\sqrt{x^2+1}}{x}$

B)  $\frac{\sqrt{x^2+1}}{x}$

C)  $\sqrt{x^2+1}$

D)  $-\sqrt{x^2+1}$

E)  $\frac{1}{x}$

If  $\sec \frac{9\pi}{5} = x$ , then  $\tan \frac{\pi}{5} =$

A)  $\sqrt{x-1}$

B)  $\frac{\sqrt{x^2-1}}{x}$

C)  $\sqrt{x^2-1}$

D)  $\sqrt{x+1}$

E)  $\sqrt{x^2+1}$

For any angle  $\theta$ , which one of the following is not possible?

A)  $\cos \theta = -\frac{4}{3}$  and  $\sec \theta = -\frac{3}{4}$

B)  $\sin^2(-\theta) + \cos^2(-\theta) = 1$

C)  $\tan \theta = 4$  and  $\cot \theta = \frac{1}{4}$

D)  $\cot^2 \theta = \csc^2 \theta - 1$

E)  $\csc \theta = -5$

The exact value of  $\sec \frac{23\pi}{6} \cot \frac{13\pi}{3} - \sin \frac{7\pi}{4}$  is equal to

A)  $\frac{4+3\sqrt{2}}{6}$

B)  $\frac{4-3\sqrt{2}}{6}$

C)  $-\frac{4+3\sqrt{2}}{6}$

D)  $\frac{3\sqrt{2}-4}{6}$

E)  $\frac{4+\sqrt{2}}{2}$

$$\sin\left(\frac{7\pi}{4}\right)\tan 600^\circ + \cos\left(-\frac{7\pi}{6}\right) =$$

A)  $-\frac{\sqrt{3}}{2}(\sqrt{2} + 1)$

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

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

D)  $\frac{\sqrt{3}}{2}(\sqrt{2} + 1)$

E)  $-\frac{\sqrt{2}}{2}(\sqrt{3} + 1)$

If  $-90^\circ < \theta < 90^\circ$ , then

A)  $\sin(\theta + 90^\circ) > 0$  and  $\sec \frac{\theta}{2} > 0$

B)  $\sin(\theta + 90^\circ) < 0$  and  $\sec \frac{\theta}{2} > 0$

C)  $\sin(\theta + 90^\circ) > 0$  and  $\sec \frac{\theta}{2} < 0$

D)  $\sin(\theta + 90^\circ) < 0$  and  $\sec \frac{\theta}{2} < 0$

E)  $\tan \theta < 0$  and  $\cos \theta > 0$

The exact value of  $\csc (225^\circ) \cdot \tan (-240^\circ) + \sin 150^\circ$  is

(a)  $\frac{1}{2} + \sqrt{6}$

(b)  $\sqrt{3} + \frac{1}{2}$

(c)  $\frac{\sqrt{2}+2\sqrt{3}}{\sqrt{3}}$

(d)  $\frac{\sqrt{6}+4\sqrt{3}}{\sqrt{2}}$

(e)  $\sqrt{6} + 2\sqrt{3}$

If  $\tan (71^\circ) = b$ , then  $\csc^2 (19^\circ) + 1 =$

A)  $b^2 + 2$

B)  $b^2 + 1$

C) 1

D)  $b^2$

E)  $b^2 - 1$

$$\cos \frac{17\pi}{4} - \tan 765^\circ \csc \frac{11\pi}{6} =$$

A)  $\frac{\sqrt{2}+4}{2}$

B)  $4\sqrt{2}$

C)  $\frac{\sqrt{2}-4}{4}$

D)  $\frac{\sqrt{3}+1}{2}$

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

$$\sin \left( -\frac{7\pi}{4} \right) + \tan (870^\circ)$$

A)  $\frac{3\sqrt{2}-2\sqrt{3}}{6}$

B)  $\frac{3}{2}$

C)  $\frac{3\sqrt{2}+2\sqrt{3}}{6}$

D)  $\frac{2\sqrt{2}-3\sqrt{3}}{6}$

E)  $\frac{-3\sqrt{2}-2\sqrt{3}}{6}$

If  $\tan (24^\circ) = t$  then  $\tan (516^\circ) + \cot (156^\circ) =$

A)  $\frac{-t^2-1}{t}$

B)  $\frac{t^2-1}{t}$

C)  $\frac{t^2+1}{t}$

D)  $\frac{-t-1}{t}$

E)  $\frac{t+1}{t}$

Which one of the following statements is TRUE?

(a) If  $90^\circ < \theta < 180^\circ$  then,  $\sin (2\theta)$  is negative.

(b)  $\sin \theta + \cos \theta = 1$  for all  $\theta$ .

(c) If  $\cot \theta = \frac{1}{2}$ , then  $\sin \theta = 1$  and  $\cos \theta = 2$ .

(d)  $\sec \theta = -0.3$ , for some  $\theta$  where  $\frac{\pi}{2} < \theta < \pi$ .

(e) If  $\sec \theta > 0$ ,  $\csc \theta > 0$ , then  $\theta$  is in the second quadrant.

Which one of the following statements is FALSE?

A) If  $90^\circ \leq \theta \leq 180^\circ$  then  $\tan\left(\frac{\theta}{2}\right)$  is negative.

B) If  $\tan \theta = \frac{1}{2}$  then the terminal side of  $\theta$  lies in quadrant I or quadrant III .

C) The range of  $\tan \theta$  is  $(-\infty, \infty)$ .

D) If  $0 \leq \theta < \frac{\pi}{2}$ , then  $\tan^2 \theta = \sec^2 \theta - 1$ .

E) If  $\tan(-15^\circ) = \beta$  then,  $\tan(15^\circ) = -\beta$ .

Which one of the following statements is FALSE?

A) If  $0 \leq \theta < \frac{\pi}{2}$  and  $\tan \theta = \frac{1}{2}$ , then  $\sin \theta = 1$  and  $\cos \theta = 2$

B) If  $0 \leq \theta < \frac{\pi}{2}$ , then  $\sec^2 \theta - \tan^2 \theta = 1$

C) If  $0 \leq \theta < \frac{\pi}{2}$ , then  $\sin\left(\frac{\theta}{2}\right)$  is positive

D) The range of  $\tan \theta$  is  $(-\infty, \infty)$

E)  $\sin\left(-\frac{\pi}{3}\right) = \sin\left(\frac{5\pi}{3}\right)$



Decide which one of the following statements is possible.

A)  $\cot \theta = 0.93$

B)  $\cos \theta = -\frac{4}{3}$

C)  $\tan \theta = \frac{3}{2}$  and  $\cot \theta = -\frac{3}{2}$

D)  $\csc \theta = -\frac{1}{2}$  and  $\sin \theta = -2$

E)  $\sec \theta = -0.3$

$\tan (420^\circ) + \sec (495^\circ)\csc (225^\circ) =$

A)  $\sqrt{3} + 2$

B)  $-\sqrt{3} + 2$

C)  $-\sqrt{3} - 2$

D)  $\frac{\sqrt{3}}{3} + 2$

E)  $-\frac{\sqrt{3}}{3} + \frac{1}{2}$

If  $\alpha$  is the least positive coterminal angle with the angle  $\frac{65\pi}{9}$ , and  $\beta$  is the reference angle of the angle  $\frac{5\pi}{9}$ , then  $\alpha + \beta =$

A)  $\frac{5\pi}{3}$

B)  $\frac{11\pi}{9}$

C)  $\frac{\pi}{9}$

D)  $\frac{-\pi}{9}$

E)  $\frac{13\pi}{9}$

The reference angle of  $\theta = \frac{11\pi}{15}$ , in degrees, is equal to

A)  $48^\circ$

B)  $32^\circ$

C)  $49^\circ$

D)  $38^\circ$

E)  $35^\circ$

If  $R$  is the reference angle of  $1945^\circ$  and  $Q$  is the smallest positive coterminal angle of  $-950^\circ$ , then  $R + Q$

A)  $165^\circ$

B)  $155^\circ$

C)  $175^\circ$

D)  $275^\circ$

E)  $255^\circ$

If the reference angle of 10 radians is  $10 - n\pi$ , then  $n =$

A) 3

B) 6

C) 4

D) 7

E) 5

The reference angle of the angle  $\theta = \frac{25\pi}{7}$  is equal to

A)  $\frac{3\pi}{7}$

B)  $\frac{2\pi}{7}$

C)  $\frac{5\pi}{7}$

D)  $\frac{\pi}{7}$

E)  $\frac{4\pi}{7}$

The smallest positive coterminal angle of  $\theta = \frac{23\pi}{7}$  is

A) in the third quadrant

B) in the first quadrant

C) in the fourth quadrant

D) a quadrantal angle

E) in the second quadrant

The sum of all coterminal angles with  $\frac{2\pi}{3}$  between  $2\pi$  and  $6\pi$  is

A)  $\frac{22\pi}{3}$

B)  $\frac{21\pi}{3}$

C)  $\frac{20\pi}{3}$

D)  $\frac{13\pi}{3}$

E)  $\frac{31\pi}{3}$

The reference angle of  $\theta = 16$  radians is equal to

A)  $16 - 5\pi$

B)  $5\pi - 16$

C)  $16 - 4\pi$

D)  $4\pi - 16$

E)  $6\pi - 16$

The reference angle of the angle  $\theta = 1225^\circ$  is

A)  $35^\circ$

B)  $65^\circ$

C)  $55^\circ$

D)  $45^\circ$

E)  $25^\circ$

The reference angle  $\alpha'$ , in radians, of the angle  $\alpha = 920^\circ$  is equal to:

A)  $\frac{\pi}{9}$

B)  $\frac{\pi}{3}$

C)  $\frac{\pi}{5}$

D)  $\frac{\pi}{10}$

E)  $\frac{\pi}{6}$

The reference angle of  $\theta = 2$  radians is equal to

A)  $\pi - 2$

B)  $2 - \pi$

C)  $2 + \pi$

D)  $2\pi - 2$

E)  $\frac{\pi}{2} - 2$

The reference angle of  $-115^\circ$  is

A)  $65^\circ$

B)  $55^\circ$

C)  $75^\circ$

D)  $45^\circ$

E)  $25^\circ$

The greatest negative angle that is coterminal with  $\frac{27\pi}{5}$  is

A)  $-\frac{3\pi}{5}$

B)  $-\pi$

C)  $-\frac{2\pi}{5}$

D)  $-\frac{4\pi}{5}$

E)  $-\frac{\pi}{5}$

If  $\alpha$  is the smallest positive coterminal angle of  $\frac{57\pi}{2}$  and  $\beta$  is reference angle of  $1270^\circ$ , then  $\alpha + \beta =$

A)  $100^\circ$

B)  $180^\circ$

C)  $190^\circ$

D)  $280^\circ$

E)  $210^\circ$



If  $\alpha$  is the reference angle of  $845^\circ$  and  $\beta$  is the least positive coterminal of  $-705^\circ$ , then  $\alpha + \beta =$

A)  $70^\circ$

B)  $80^\circ$

C)  $180^\circ$

D)  $160^\circ$

E)  $150^\circ$

If  $\theta = \frac{13\pi}{18}$ , then the degree measure of the reference angle of  $\theta$  is

(A)  $50^\circ$

B)  $60^\circ$

C)  $45^\circ$

D)  $70^\circ$

E)  $36^\circ$

If  $\alpha'$  is the reference angle of  $\alpha = -4$  and  $\beta'$  is the reference of  $\beta = 7$  then  $\alpha' + \beta' =$

A)  $3 - 2\pi$

B)  $3 - \pi$

C)  $11 - 3\pi$

D)  $11 - 2\pi$

E)  $2\pi - 3$

The value of  $2 - \sin^2(40^\circ) - \sin^2(50^\circ)$  is

A) -3

B) 0

C) 3

D) 1

E) -1

The value of  $1 - \cos^2 (20^\circ) - \cos^2 (70^\circ)$  is

A)  $\cos^2 (90^\circ)$

B)  $\sin^2 (90^\circ)$

C)  $\sin^2 (70^\circ)$

D)  $1 - \sin^2 (20^\circ)$

E)  $\sin^2 (20^\circ) - \cos^2 (20^\circ)$

Let the point  $(k, -2)$  lie on the terminal side of angle  $\theta$  in standard position. If  $\csc \theta = -3$ , where  $\cos \theta > 0$ , then the value of  $k$  is equal to

A)  $4\sqrt{2}$

B)  $-4\sqrt{2}$

C)  $2\sqrt{2}$

D)  $-2\sqrt{2}$

E)  $-\sqrt{2}$

If the terminal side of an angle  $\theta$ , in standard position, is in quadrant III and has slope equal  $\frac{1}{2}$ , then  $\sin \theta + \cos \theta =$

A)  $-\frac{3\sqrt{5}}{5}$

B)  $-\frac{\sqrt{5}}{5}$

C)  $\sqrt{5}$

D)  $-\frac{2\sqrt{3}}{5}$

E)  $\sqrt{3}$

If  $\tan \theta = 4$  and  $P(-3, n)$  is a point on the terminal side of  $\theta$  where  $\theta$  is in standard position, then  $\sec \theta =$

A)  $\sqrt{17}$

B)  $-\frac{5}{3}$

C)  $-\sqrt{17}$

D)  $-\frac{1}{4}$

E)  $-\frac{\sqrt{17}}{4}$

If the terminal side of an angle  $\theta$  in standard position is given by  $Ax + y = 0$ ,  $x < 0$  and  $\sin \theta = \frac{1}{3}$ , then  $A =$

A)  $\frac{\sqrt{2}}{4}$

B)  $-\frac{\sqrt{2}}{4}$

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

D) 1

E)  $\frac{3\sqrt{2}}{8}$

If the point  $\left(-\frac{1}{2}, \frac{\sqrt{3}}{2}\right)$  is on the terminal side of the angle  $\theta$  in standard position, then  $\tan \theta =$

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

B) -2

C)  $-\sqrt{3}$

D)  $-\frac{2\sqrt{3}}{3}$

E)  $-\frac{\sqrt{3}}{2}$

If the terminal side of an angle  $\theta$ , in standard position, is defined by  $x - 2y = 0, x > 0$ , then  $\sec \theta =$

A)  $\frac{2\sqrt{5}}{5}$

B)  $\frac{\sqrt{5}}{2}$

C)  $\frac{1}{2}$

D)  $\sqrt{5}$

E)  $\frac{5}{2}$

If the terminal side of an angle  $\theta$  in standard position is defined by  $3x + 2y = 0, x \leq 0$ , then  $\csc \theta =$

A)  $\frac{\sqrt{13}}{3}$

B)  $-\sqrt{13}$

C)  $\frac{3\sqrt{13}}{13}$

D)  $-\frac{3\sqrt{13}}{13}$

E)  $-\frac{\sqrt{13}}{3}$

If the terminal side of an angle  $\theta$  in standard position is given by  $3x - y = 0, x < 0$ , then  $\csc \theta =$

A)  $-\frac{3\sqrt{10}}{10}$

B)  $\frac{\sqrt{10}}{3}$

C)  $\frac{3\sqrt{10}}{10}$

D)  $-\frac{\sqrt{10}}{3}$

E) -3

Suppose that the terminal side of the angle  $\theta$  in standard position is given by  $12x - 5y = 0, x \leq 0$ , then  $\frac{60}{13}(\sec \theta + \csc \theta) =$

A) -17

B) -7

C) 7

D) -8

E) 17

If the equation of the terminal side of  $\theta$  in standard position is  $x + 2y = 0, x \geq 0$ , then  $\sin \theta - \cos \theta =$

A)  $-\frac{3\sqrt{5}}{5}$

B)  $-\frac{\sqrt{5}}{5}$

C)  $-\sqrt{5}$

D)  $\frac{\sqrt{5}}{5}$

E)  $\sqrt{5}$

If the equation of the terminal side of an angle  $\theta$  in standard position is  $4x + 3y = 0$ , where  $x < 0$ , then  $\csc \theta + \sec \theta =$

A)  $-\frac{5}{12}$

B)  $\frac{5}{12}$

C)  $-\frac{7}{12}$

D)  $\frac{7}{5}$

E)  $-\frac{1}{5}$



If the point  $(2, -3)$  is on the terminal side of the angle  $\theta$  in the standard position, then  $12\csc \theta + 4\sec \theta$  is equal to

(A)  $-2\sqrt{13}$

B)  $-\sqrt{13}$

C)  $\sqrt{13}$

D)  $2\sqrt{13}$

E)  $-\frac{18\sqrt{13}}{13}$

The equation of the terminal side of  $\theta$  is given by  $\sqrt{3}x + y = 0$ , where  $x \leq 0$ , then  $\csc \theta =$

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

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

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

D)  $-\frac{2\sqrt{3}}{3}$

E)  $\frac{1}{2}$

If the equation of the terminal side of an angle  $\theta$  in standard position is  $4x - 3y = 0, x < 0$ , then  $4\csc \theta + 9\tan \theta =$

A) 7

B) -5

C) 11

D) -6

E) 10

If the terminal side of the angle  $\theta$  in the standard position coincides with the line  $\sqrt{3}x + y = 0$ , with  $x \leq 0$  then

(a)  $\cot \theta = -\frac{\sqrt{3}}{3}$

(b)  $\tan \theta = \sqrt{3}$

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

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

(e)  $\tan \theta = -2$

If  $12x - 5y = 0, x \leq 0$ , is the equation of the terminal side of an angle  $\alpha$ , then  $5\tan \alpha - 12\csc \alpha =$

A) 25

B) - 1

C) 15

D) 20

E) -25

Suppose that the terminal side of an angle  $\theta$  in standard position lies on the line  $y = -\frac{1}{2}x$  where  $x > 0$ , then  $\sin \theta + \tan \theta =$

A)  $-\frac{5+2\sqrt{5}}{10}$

B)  $-\frac{10+\sqrt{5}}{5}$

C)  $\frac{2-\sqrt{5}}{5}$

D)  $-\frac{10-2\sqrt{5}}{10}$

E)  $\frac{1-\sqrt{5}}{10}$

If  $\sin \theta = \frac{1}{5}$ , and  $p(-3, k)$  is a point on the terminal side of  $\theta$  in standard position, then the value of  $k$  is:

A)  $\frac{\sqrt{6}}{4}$

B)  $-\frac{\sqrt{6}}{2}$

C)  $-\frac{\sqrt{6}}{4}$

D) 1

E)  $\frac{\sqrt{6}}{2}$

If the terminal side of the angle  $\theta$  in standard position is defined by  $6x + 8y = 0, y < 0$  then  $10\cos \theta - 12\tan \theta =$

A) 17

B) -17

C) -1

D) 1

E) 24

If the angle  $\theta = 12$  radian, then

(a)  $\theta$  is in the fourth quadrant

(b)  $\theta$  is a quadrantal angle

(c)  $\theta$  is in the first quadrant

(d)  $\theta$  is in the second quadrant

(e)  $\theta$  is in the third quadrant

If  $(a, -\frac{3}{4})$  is a point on a unit circle on the terminal side of an angle  $\theta$ , in standard position, in quadrant III, then  $\cos \theta =$

A)  $-\frac{\sqrt{7}}{4}$

B)  $-\frac{\sqrt{7}}{2}$

C)  $-\frac{a}{4}$

D)  $-\frac{a}{2}$

E)  $-\frac{5}{4}$

The exact value of  $\left[ \tan \left( \frac{11\pi}{4} \right) + \sin \left( -\frac{13\pi}{6} \right) \right] \div (\csc^2 25^\circ - \cot^2 25^\circ)$ , is

A)  $-\frac{3}{2}$

B)  $\frac{1}{2}$

C) 0

D)  $\frac{3}{2}$

E)  $-\frac{1}{2}$

For  $\frac{\pi}{2} < \theta < \pi$ , if  $x = 5\sec \theta$ , then  $\frac{\sqrt{x^2-25}}{x} =$

A)  $-\sin \theta$

B)  $\sin \theta$

C)  $-\cos \theta$

D)  $\cos \theta$

E)  $-\sin \theta \sec^2 \theta$

If  $A$  and  $B$  are the two acute angles in a right triangle, then  $\frac{\sec B}{\sec A} =$

A)  $\cos A$

B)  $\sin A$

C)  $\tan A$

D) 1

E)  $\cot A$

If  $A$  and  $B$  are two acute angles in a right triangle, then  $\frac{\csc A}{\csc B} =$

A)  $\tan B$

B)  $\sin B$

C)  $\cos B$

D)  $\cot B$

E) 1