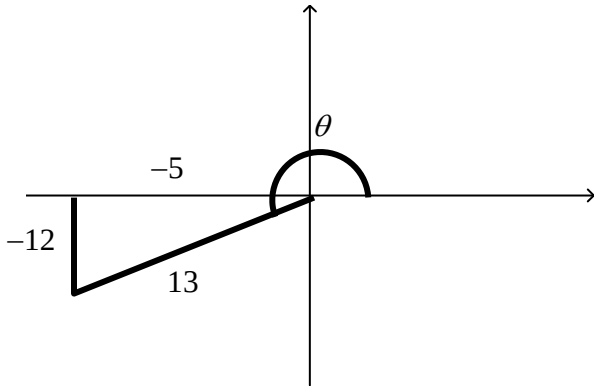
King Fahd University of Petroleum and Minerals
Perp-Year Math Program
Math 002 - Term 062
Recitation Hour (5.3 & 5.4)

Question1:

If the terminal side of an angle θ passes through the point $(-5,-12)$, then find $\dfrac{\sec\theta-\tan\theta}{\cos\theta+\sin\theta}$.

Solution



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

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

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

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

$$\frac{\sec\theta-\tan\theta}{\cos\theta+\sin\theta}=\frac{\frac{-13}{5}-\frac{12}{5}}{\frac{-5}{13}+\frac{-12}{13}}=\frac{65}{17}$$

Question2:

a) Find the measure of the reference angle θ' for the given angle θ

1. $-570°$

Solution

$$\theta = -570° + 2(360°) = 150° \Rightarrow \theta' = 180° - 150° = 30°$$

2. 30 radians

Solution

$$\theta = 30 = 4(2\pi) + 4.88 \Rightarrow \theta \in IV\ Q$$
$$\theta' = 2\pi - (30 - 8\pi) = 10\pi - 30$$

b) Find the exact value of $\cos 44° + \cos 136° + \sin(-510°)$.

Solution

$$\begin{aligned}\cos 44° + \cos 136° + \sin(-510°) &= \cos 44° - \cos 44° - \sin 510° \\ &= -\sin 150° \\ &= -\sin 30° \\ &= -\frac{1}{2}\end{aligned}$$

c) Find the exact value of $\cos\frac{31\pi}{4} - \cos\frac{23\pi}{3} - \csc(-570°)$.

Solution

$$\begin{aligned}\cos\frac{31\pi}{4} - \cos\frac{23\pi}{3} - \csc(-570°) &= \cos(7\pi + \frac{3\pi}{4}) - \cos(5\pi + \frac{3\pi}{4}) + \csc 570° \\ &= \cos(\pi + \frac{3\pi}{4}) - \cos(\pi + \frac{3\pi}{4}) + \csc 210° \\ &= -\csc 30° \\ &= -\frac{1}{2}\end{aligned}$$

Question3:

a) If W is the wrapping function, then find $W(-\frac{19\pi}{3})$.

Solution

$$W(-\frac{19\pi}{6}) = \left(\cos(-\frac{19\pi}{6}), \sin(-\frac{19\pi}{6})\right)$$
$$= \left(\cos(\frac{19\pi}{6}), -\sin(\frac{19\pi}{6})\right)$$
$$= \left(\cos(3\pi + \frac{\pi}{6}), -\sin(3\pi + \frac{\pi}{6})\right)$$
$$= \left(\cos(\pi + \frac{\pi}{6}), -\sin(\pi + \frac{\pi}{6})\right)$$
$$= \left(-\cos\frac{\pi}{6}, \sin\frac{\pi}{6}\right)$$
$$= \left(-\frac{\sqrt{3}}{2}, \frac{1}{2}\right)$$

b) If $\cos 170° = k$, then find the value of $\cos 350° + 2\csc 190°$, in terms of k.

Solution

- $\cos 170° = k \Rightarrow -\cos 10° = k \Rightarrow \cos 10° = -k$
- $\cos 350° = \cos 10° = -k$
- $\csc 190° = -\csc 10° = -\frac{1}{\sin 10°} = -\frac{1}{\sqrt{1-\cos^2 10°}} = -\frac{1}{\sqrt{1-k^2}}$

$\therefore \cos 350° + 2\csc 190° = -k - \frac{1}{\sqrt{1-k^2}}$

Question4:

a) Write $\csc t$ in terms of $\tan t$, $\pi < t < \frac{3\pi}{2}$.

Solution

$$\csc t = \frac{1}{\sin t} \cdot \frac{\cos t}{\cos t} = \frac{\cos t}{\sin t} \cdot \frac{1}{\cos t} = \frac{1}{\tan t} . \sec t$$

but $1 + \tan^2 t = \sec^2 t \Rightarrow \sec t = \pm\sqrt{1 + \tan^2 t}$.

Since $\pi < t < \frac{3\pi}{2} \Rightarrow \sec t = -\sqrt{1 + \tan^2 t}$.

$$\therefore \csc t = \frac{-\sqrt{1 + \tan^2 t}}{\tan t}$$

b) Determine whether the function $f(x) = x \tan x$ is even, odd, or neither.

Solution

$f(-x) = (-x)\tan(-x) = x \tan x = f(x) \Rightarrow f(x)$ is an even function