

Solving Trig Equations

Review on Voltage

1. $v(t) = 120 \sin(100\pi t)$ $t = 0.0025$ seconds

$$V(0.0025) = 120 \sin(100\pi(0.0025))$$

Frequency: $\omega = 100\pi \rightarrow f = \frac{\omega}{2\pi} = \frac{100\pi}{2\pi} = 50 \text{ Hz}$

Voltage = $120 \sin(100\pi(0.0025)) \rightarrow 120 \sin(0.25\pi)$

$$V = 120(0.7071) = 84.85 \text{ V}$$

2. $v(t) = 170 \cos(377t + 30^\circ)$ Time = 0.002 seconds

$$V(0.002) = 170 \cos(377(0.002) + 30^\circ)$$

radians

$$30^\circ \cdot \frac{\pi}{180} = 0.524$$

$$V = 170 \cos(0.754 + 0.524)$$

$$V = 170 \cos(1.278)$$

$$V = 170(0.289)$$

$$V = 49.13 \text{ V}$$

3. Given that $\cos(s) = 4/6$ in Q4 and $\sin(t) = -4/5$ in Q3 what is $\cos(s+t)$.

$$\star \sin^2 + \cos^2 = 1$$

$$\sin^2(s) = 1 - \cos^2(s)$$

$$\sin^2(s) = 1 - \left(\frac{4}{6}\right)^2$$

$$1 - \left(\frac{16}{36}\right)$$

$$\sqrt{\frac{36}{36} - \frac{16}{36}} = \frac{20 \div 4}{36 \div 4} = \sqrt{\frac{5}{9}} = \frac{\sqrt{5}}{3} = \sin(s)$$

$$\cos^2(t) = 1 - \sin^2(t)$$

$$\cos^2(t) = 1 - \left(-\frac{4}{5}\right)^2$$

$$\cos^2(t) = 1 - \frac{16}{25}$$

$$\frac{25}{25} - \frac{16}{25} = \sqrt{\frac{9}{25}}$$

$$\cos(t) = -\frac{3}{5}$$

$$\cos(s+t) = \left(\frac{4}{6}\right)\left(-\frac{3}{5}\right) - \left(\frac{\sqrt{5}}{3}\right)\left(-\frac{4}{5}\right) = \left(-\frac{12}{30}\right) - \left(\frac{\sqrt{5}-4}{15}\right)$$

$$= \frac{-6 - 4\sqrt{5}}{15} \leftarrow \left(-\frac{6}{15}\right) - \left(\frac{2\sqrt{5}-4}{15}\right)$$

Student A11

Q1 to Q3

take Calculus

Solving Trig Equations

1. $6 \tan x = 2\sqrt{3}$
 $\frac{6}{6} \tan x = \frac{2\sqrt{3}}{6}$

$\tan x = \frac{\sqrt{3}}{3}$

$\tan x = \frac{\sqrt{3}}{3} \Rightarrow \frac{\sin x}{\cos x} = \frac{\frac{\sqrt{3}}{2}}{\frac{1}{2}} = \frac{\sqrt{3}}{1}$

2. $-4 + 5 \cos x = -7 + 2 \cos x$

$+7 - 2 \cos x + 7 - 2 \cos x$

$3 + 3 \cos x = 0$

$-3 + 3 \cos x = 0$

$\frac{3 \cos x}{3} = \frac{-3}{3}$

3. $\cos^2 x \sin^2 x = -\cos^2 x$
 $+ \cos^2 x + \cos^2 x$

$\cos^2 x \sin^2 x + \cos^2 x = 0$

$\cos^2 x (\sin^2 x + 1) = 0$

$\sqrt{\cos^2 x} = \sqrt{0} \Rightarrow \cos x = 0$

$\sin^2 x + 1 = 0$

$\sqrt{\sin^2 x} = \sqrt{-1}$
 $\sin x = \pm 1$

4. $\csc^2 x + 1 = 2 \csc x$

$-2 \csc x - 2 \csc x$

$\csc^2 x + 1 - 2 \csc x$

$(\csc x - 1)^2 = 0 \Rightarrow (\csc x - 1) = 0$

$\csc x - 1 = 0 \Rightarrow \csc x = 1$

5. $\sqrt{3} \csc^2 x - 2 \csc x - 2 \sqrt{3} \csc x + 4 = 0$

$(\sqrt{3} \csc^2 x - 2 \csc x) (-2 \sqrt{3} \csc x + 4) = 0$

$\csc x (\sqrt{3} \csc x - 2) - 2 (\sqrt{3} \csc x - 2) = 0$

$\sqrt{3} \csc x - 2 = 0 \Rightarrow \csc x = \frac{2}{\sqrt{3}}$

$\frac{\sqrt{3} \csc x}{\sqrt{3}} = \frac{2}{\sqrt{3}} \Rightarrow \sin x = \frac{\sqrt{3}}{2}$

$\left\{ \frac{\pi}{6}, \frac{5\pi}{6} \right\}$

$\cos x = -1 \Rightarrow \{ \pi \}$

$\left\{ \frac{\pi}{2}, \frac{3\pi}{2} \right\}$

$\left\{ \frac{\pi}{2} \right\}$

$\left\{ \frac{\pi}{6}, \frac{5\pi}{6}, \frac{2\pi}{3}, \frac{4\pi}{3} \right\}$