
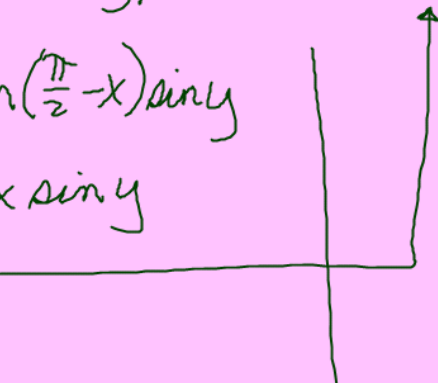


Homework: Study hard for 5.3-5.4 Test tomorrow

$$\begin{aligned} 24. \quad & \tan\left(x - \frac{\pi}{2}\right) = -\cot x \\ & \tan\left(-\left(\frac{\pi}{2} - x\right)\right) \\ & -\tan\left(\frac{\pi}{2} - x\right) \\ & -\cot x \end{aligned}$$


$$\begin{aligned} 26. \quad & \cos\left(\left(\frac{\pi}{2} - x\right) - y\right) = \sin(x+y) \\ & \cos\left(\frac{\pi}{2} - x\right)\cos y + \sin\left(\frac{\pi}{2} - x\right)\sin y \\ & \sin x \cos y + \cos x \sin y \\ & \sin(x+y) \end{aligned}$$


$$32. \tan 195^\circ$$

$$= \tan \frac{390^\circ}{2}$$

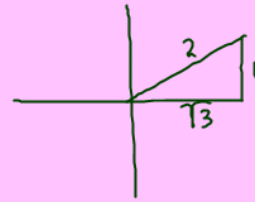
$$= \frac{\sin u}{1 + \cos u}$$

$$\text{or } \frac{1 - \cos u}{\sin u}$$

$$= \frac{1 - \cos 390^\circ}{\sin 390^\circ}$$

$$= \frac{1 - \frac{\sqrt{3}}{2}}{\frac{1}{2}}$$

$$= \boxed{2 - \sqrt{3}}$$



$$16. \cos 6x$$

$$\cos(2(3x))$$

$$w = 3x$$

$$\cos 2w$$

$$2\cos^2 w - 1$$

$$2\cos^2(3x) - 1$$

$$= 2\cos^2 3x - 1$$



$$2 \sin x \cos^2 x$$

$$2 \cdot \sin x \cdot \cos x \cdot \cos x$$

$$\sin x \cdot 2 \cdot \cos x \cdot \cos x$$

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24. $\cos 2x + \sin x = 0$

$$1 - 2\sin^2 x + \sin x = 0$$

$$0 = 2\sin^2 x - \sin x - 1$$

$$u = \sin x$$

$$2u^2 - u - 1$$

$$(2u+1)(u-1)$$

$$0 = (2\sin x + 1)(\sin x - 1)$$

$$2\sin x + 1 = 0 \quad \vee \quad \sin x - 1 = 0$$

$$\sin x = -\frac{1}{2}$$

$$\sin x = 1$$

$$x = \frac{\pi}{2}$$

$$x = \frac{7\pi}{6}, \frac{11\pi}{6}$$

30.

$$\cos(\theta + \pi/2) = -\sin \theta$$

$$\cos \theta \cos \pi/2 - \sin \theta \sin \pi/2$$

$$\cancel{\cos \theta} - \sin \theta \quad (1)$$

$$-\sin \theta = -\sin \theta$$



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 $[0, 2\pi)$

$$26. \sin x + \sin 3x = 0$$

$$\sin x + \sin(2x+x) = 0$$

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

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

$$\cancel{\sin x} + 2 \sin x \cos^2 x + 2 \sin x \cos^2 x - \cancel{\sin x} = 0$$

$$4 \cos^2 x \sin x = 0$$

$$\cos^2 x = 0 \quad \text{or} \quad \sin x = 0$$

$$\cos x = 0$$

$$x = \frac{\pi}{2}, \frac{3\pi}{2}$$

$$x = 0$$

$$x = \pi$$

$$18. \quad 2 \cot 2x$$

$$2 \cdot \frac{1}{\tan 2x}$$

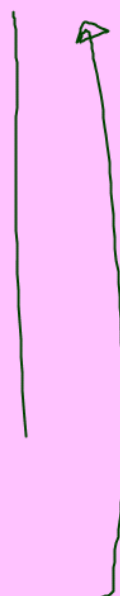
$$\frac{2}{\frac{2 \tan x}{1 - \tan^2 x}}$$

$$\frac{1}{1} \cdot \frac{1 - \tan^2 x}{2 \tan x}$$

$$\frac{1}{\tan x} - \frac{\tan^2 x}{\tan x}$$

$$\cot x - \tan x$$

$$= \cot x - \tan x$$



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$$20. \quad \sin 3x$$

$$\sin(2x+x)$$

$$\sin 2x \cos x + \cos 2x \sin x$$

$$2 \sin x \cos^2 x + (1 - 2 \sin^2 x) \sin x$$

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

$$2 \sin x (1 - \sin^2 x) + \sin x - 2 \sin^3 x$$

$$2 \sin x - 2 \sin^3 x + \sin x - 2 \sin^3 x$$

$$3 \sin x - 4 \sin^3 x$$

$$\sin x (3 - 4 \sin^2 x)$$

$$= \sin x (3 - 4 \sin^2 x)$$



$$\sin 75 = \sin \frac{150}{2}$$

$$= \sqrt{\frac{1 - \cos 150}{2}}$$

$$= \sqrt{\frac{1 - \cos 150}{2}}$$

$$= \sqrt{\frac{\frac{2}{2} - \frac{\sqrt{3}}{2}}{2}} = \sqrt{\frac{\frac{2 - \sqrt{3}}{2}}{2}}$$

$$= \sqrt{\frac{2 - \sqrt{3}}{2} \cdot \frac{1}{2}} = \sqrt{\frac{2 - \sqrt{3}}{4}} = \boxed{\frac{\sqrt{2 - \sqrt{3}}}{2}}$$

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$$27. \sin 2x + \sin 4x = 0 \quad [0, 2\pi)$$

$$\sin 2x + \sin(2(2x)) = 0$$

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

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

$$\sin 2x = 0$$

$$2x = 0 \text{ or } 2x = \pi$$

$$\boxed{x = 0 \quad x = \frac{\pi}{2}}$$

$$2x = 2\pi \quad 2x = 3\pi$$

$$\boxed{x = \pi \quad x = \frac{3\pi}{2}}$$

$$\cancel{2x = 4\pi}$$

$$\cancel{x = 2\pi}$$

$$\text{or } 1 + 2\cos 2x = 0$$

$$\cos 2x = -\frac{1}{2}$$

$$2x = \frac{2\pi}{3} \quad 2x = \frac{4\pi}{3}$$

$$2x = \frac{8\pi}{3} \quad 2x = \frac{10\pi}{3}$$

$$\boxed{x = \frac{\pi}{3}, \frac{2\pi}{3}, \frac{4\pi}{3}, \frac{5\pi}{3}}$$

$$\cos^2 x - \sin^2 x = \cos 2x$$

$$2\cos^2 x - 1 =$$

$$1 - 2\sin^2 x =$$

$$32. \tan 195^\circ = \tan \frac{390^\circ}{2}$$

$$= \frac{\sin u}{1 + \cos u} \quad \text{or} \quad \frac{1 - \cos u}{\sin u} \quad \text{or} \quad \pm \sqrt{\frac{1 - \cos u}{1 + \cos u}}$$

$$= \frac{1 - \cos 390^\circ}{\sin 390^\circ}$$

$$= \frac{1 - \frac{\sqrt{3}}{2}}{\frac{1}{2}}$$

$$= \frac{\frac{2 - \sqrt{3}}{2}}{\frac{1}{2}} = \frac{2 - \sqrt{3}}{2} \cdot \frac{2}{1}$$

$$= \boxed{2 - \sqrt{3}}$$

$$\begin{aligned}
& \sin 2x + \sin 4x = 0 \\
& 2 \sin x \cos x + \sin(2(2x)) = 0 \\
& 2 \sin x \cos x + 2 \sin 2x \cos 2x \\
& 2 \sin x \cos x + 2(2 \sin x \cos x)(2 \cos^2 x - 1) = 0 \\
& 2 \sin x \cos x (1 + 2(2 \cos^2 x - 1)) = 0 \\
& 2 \sin x \cos x (1 + 4 \cos^2 x - 2) = 0 \\
& (2 \sin x \cos x)(4 \cos^2 x - 1) = 0 \\
& \sin x = 0 \text{ or } \cos x = 0 \text{ or } 4 \cos^2 x - 1 = 0 \\
& x = 0, \pi \text{ or } x = \frac{\pi}{2}, \frac{3\pi}{2} \text{ or } \cos^2 x = \frac{1}{4} \\
& \cos x = \pm \frac{1}{2} \\
& x = \frac{\pi}{3}, \frac{2\pi}{3}, \frac{4\pi}{3}, \frac{5\pi}{3}
\end{aligned}$$

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$$\begin{aligned}
26. \quad & \sin x + \sin 3x = 0 \\
& \sin x + \sin(2x+x) = 0 \\
& \sin x + \sin 2x \cos x + \cos 2x \sin x = 0 \\
& \sin x + 2 \sin x \cos^2 x + (2 \cos^2 x - 1) \sin x = 0 \\
& \cancel{\sin x} + 2 \sin x \cos^2 x + 2 \sin x \cos^2 x - \cancel{\sin x} = 0 \\
& 4 \sin x \cos^2 x = 0 \\
& \sin x = 0 \quad \cos^2 x = 0 \\
& x = 0, \pi \quad \cos x = 0 \\
& \quad \quad \quad x = \frac{\pi}{2}, \frac{3\pi}{2}
\end{aligned}$$