. [– / 1 Points]

Solve the equation. (Enter your answers as a comma-separated list. Use n as an integer constant. Enter your response in radians.)

$$8\cos^2(x) + 4\cos(x) - 4 = 0$$

$x =$ ✗ $2\pi n + \frac{\pi}{3}, 2\pi n + \pi, 2\pi n + \frac{5\pi}{3}$

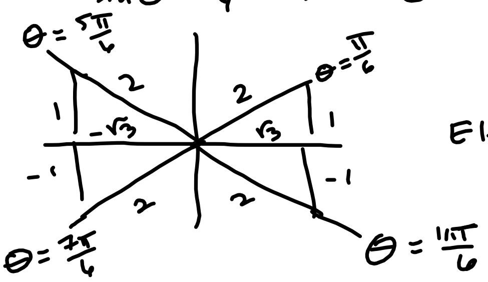
As a set handwritten

$\{2\pi n + \frac{\pi}{3}, 2\pi n + \pi, 2\pi n + \frac{5\pi}{3} \mid n \in \mathbb{Z}\}$

WebAssign isn't as formal.

$2\pi n + \frac{\pi}{3}, 2\pi n + \pi, 2\pi n + \frac{5\pi}{3}$, where $n \in \mathbb{Z}$

$\sin^2\theta = \frac{1}{4} \Rightarrow \sin\theta = \pm\frac{1}{2}$



$\theta = 2\pi n + \frac{\pi}{3}, 2\pi n + \pi, 2\pi n + \frac{5\pi}{3}\ \forall\, n \in \mathbb{Z}$.

Elegant:

$\frac{\pi}{6} + n\pi, \frac{5\pi}{6} + n\pi, n \in \mathbb{Z}$.

Brute Force:

$\frac{\pi}{6} + 2n\pi, \frac{5\pi}{6} + 2n\pi, \frac{7\pi}{6} + 2n\pi, \frac{11\pi}{6} + 2n\pi, n \in \mathbb{Z}$

Solve the equation. (Enter your answers as a comma-separated list. Use n as an integer constant. Enter your response in radians.)

$$\csc^2(x) - 9\csc(x) = 0$$

$x =$

$\pi - 0.1113 + 2\pi n\ ,\ 3.0303 + 2\pi n$

Your answer includes 2 characters that can't be graded.
Delete your recent changes and use the pad tools to finish your answer. More information

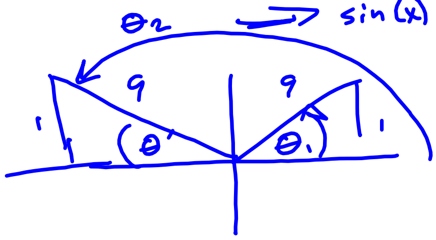
$2\pi n + \sin^{-1}\left(\frac{1}{9}\right), 2\pi n + \pi - \sin^{-1}\left(\frac{1}{9}\right)$

$$\csc^2(x) - 9\csc(x) = 0$$

$$\csc(x)\left[\csc(x) - 9\right] = 0$$

$$\Rightarrow \csc(x) = 0 \quad \text{OR} \quad \csc(x) = 9$$

$$\Rightarrow \sin(x) = \frac{1}{9}$$



$\theta_1 = \arcsin(\frac{1}{9})$ is irrational.

$\theta_2 = \pi - \arcsin(\frac{1}{9})$

All sol'ns

Angle Sum Formula

$\sin(x+y) = \sin(x)\cos(y) + \sin(y)\cos(x)$

$\cos(x+y) = \cos(x)\cos(y) - \sin(x)\sin(y)$

$\tan(x+y) = \dfrac{\sin(x)\cos(y) + \sin(y)\cos(x)}{\cos(x)\cos(y) - \sin(x)\sin(y)}$

$\tan(x+y) = \dfrac{\tan(x) + \tan(y)}{1 - \tan(x)\tan(y)}$

Not on my cheat sheet. Should be.

Click for Cheat Sheet

Double-Angle.

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

$\cos(2x) = \cos^2(x) - \sin^2(x)$ used to derive $\frac{1}{2}$-angle

$\tan(2x) = \dfrac{2\tan(x)}{1 - \tan^2(x)}$

$\frac{1}{2}$-angle :

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

$\cos(u) = \cos^2(\frac{u}{2}) - \sin^2(\frac{u}{2}) = \cos^2(\frac{u}{2}) - (1 - \cos^2(\frac{u}{2}))$

$= 2\cos^2(\frac{u}{2}) - 1 = \cos(2x)$

$\Rightarrow 2\cos^2(\frac{u}{2}) = 1 + \cos(u)$

$\cos^2(\frac{u}{2}) = \dfrac{1 + \cos(u)}{2}$

$\Rightarrow \cos(\frac{u}{2}) = \pm\sqrt{\dfrac{1 + \cos(u)}{2}}$

& $\pm$ depends on what quadrant $\frac{u}{2}$ is in.

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

$\cos(u) = 1 - 2\sin^2(\frac{u}{2}) \Rightarrow$

$-2\sin^2(\frac{u}{2}) = \cos(u) - 1$

$\sin^2(\frac{u}{2}) = \dfrac{1 - \cos(u)}{2}$

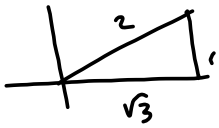
$\sin(\frac{u}{2}) = \pm\sqrt{\dfrac{1 - \cos(u)}{2}}$

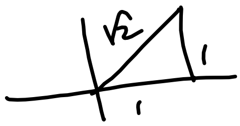
Find exact value:

$\sin\left(\frac{5\pi}{12}\right)$ in 2 ways:

Angle Sum: $\sin\left(\frac{5\pi}{12}\right) = \sin\left(\frac{2\pi}{12} + \frac{3\pi}{12}\right) = \sin\left(\frac{\pi}{6} + \frac{\pi}{4}\right)$

$= \sin\frac{\pi}{6}\cos\frac{\pi}{4} + \sin\frac{\pi}{4}\cos\frac{\pi}{6} = \frac{1}{2}\cdot\frac{1}{\sqrt{2}} + \frac{1}{\sqrt{2}}\cdot\frac{\sqrt{3}}{2} = \boxed{\frac{1+\sqrt{3}}{2\sqrt{2}}}$ FINE





Rationalize:

$\boxed{= \frac{\sqrt{2}+\sqrt{6}}{4}}$ optional usually.

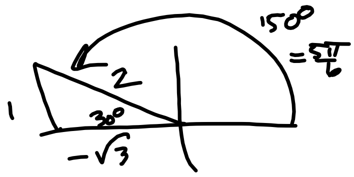
$\frac{1}{2}$ - angle

$\frac{5\pi}{12} = \frac{u}{2} \implies u = \frac{5\pi}{6}$

$\frac{5\pi}{12} \in \left(0, \frac{\pi}{2}\right)$, i.e. $\in$ QI

$\sin\frac{5\pi}{12} > 0$ "+"

$\sin\left(\frac{u}{2}\right) = \pm\sqrt{\frac{1-\cos(u)}{2}} = +\sqrt{\frac{1-\cos\left(\frac{5\pi}{6}\right)}{2}} = \sqrt{\frac{1+\frac{\sqrt{3}}{2}}{2}}$



$= \sqrt{\frac{\frac{2+\sqrt{3}}{2}}{2}} = \sqrt{\frac{2+\sqrt{3}}{4}}$

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

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

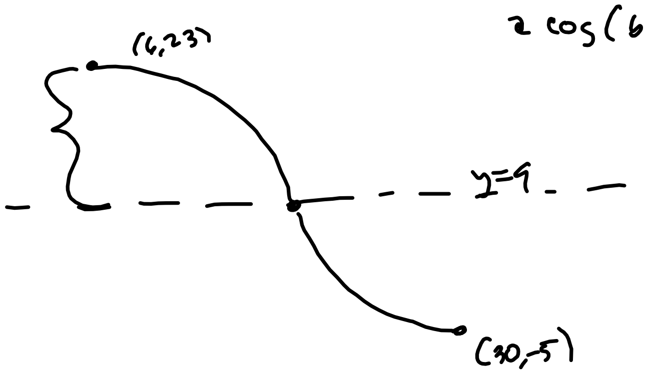
$= 0.965925826289$

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

$= 0.965925826289$

. (5 pts) Write the cosine function that achieves its maximum height of $y = 23$ centimeters at time $t = 6$ seconds and its minimum height of $y = -5$ centimeters at $t = 30$ seconds.

$a\cos(b(x-c)) + d$



$\frac{23-5}{2} = \frac{18}{2} = \boxed{9 = d}$

$\frac{23-(-5)}{2} = \frac{28}{2} = \boxed{14 = a}$

Period = $2(30-6) = 2(24) = 48$

want $bx = 2\pi$ when $x = 48$

$48b = 2\pi$

$b = \frac{2\pi}{48} = \frac{\pi}{24}$

Start @ the high point $t=6$:

$$\boxed{14\cos\left(\frac{\pi}{24}(x-6)\right) + 9}$$