Questions? I'm about to open up Test 1 Re-Take.

§ 2.3 # 42. $\boxed{f(x) = 8\cos^2(x) - \sin(x)}$

EQUATION: $\underline{-16\cos(x)\sin(x) - \cos(x)} = 0$

The slope function or Derived function of f(x)!

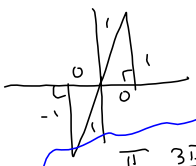
$-16\cos(x)\sin(x) - \cos(x) = -\cos(x)\left[16\sin(x) + 1\right] \overset{\text{SET}}{=} 0$

$-\cos(x) = 0$ $\qquad$ $16\sin(x) + 1 = 0$

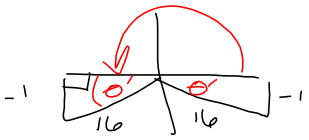
$\cos(x) = 0$ $\qquad$ $16\sin(x) = -1$

$\sin(x) = -\frac{1}{16}$

$\theta' = \arcsin\left(\frac{1}{16}\right)$



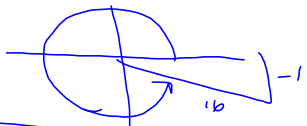
$x = \frac{\pi}{2}, \frac{3\pi}{2}$



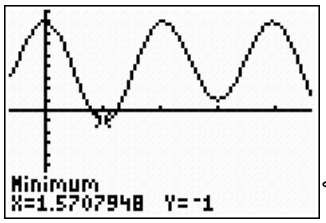
$\arcsin\left(-\frac{1}{16}\right), \pi - \arcsin\left(-\frac{1}{16}\right)$

$\boxed{-\arcsin\left(\frac{1}{16}\right)}, \boxed{\pi + \arcsin\left(\frac{1}{16}\right)}$

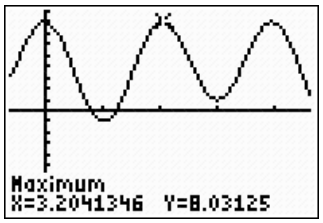
Make this between 0 & 2π



$\boxed{2\pi - \arcsin\left(\frac{1}{16}\right)}$



$(1.5708, -1)$



TI-84

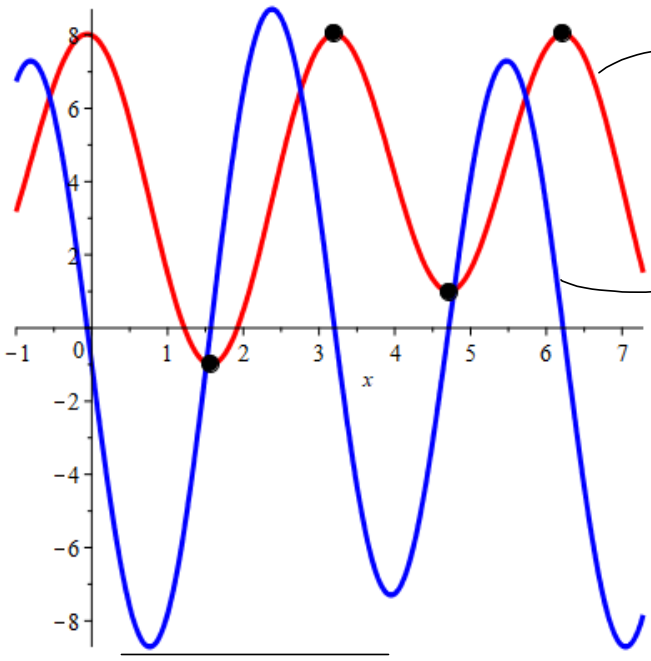
[[1.570796327, -1.], [4.712388981, 1.], [3.204133416, 8.031250000], [6.220644546, 8.031250000]]

Using MAPLE TO Build an xy-list

Jocelyn uses Desmos better than I can at this writing.
I can't get 4-digit precision out of it

Semi-by-hand method:

Solve equation on right by hand.
Plug those values into the function on the left.



→ f(x)

→ f'(x) from eq'n on the right

"f'(x)" is the SLOPE function for f(x).

Where slope = 0, f(x) is MAX! (OR MIN!)

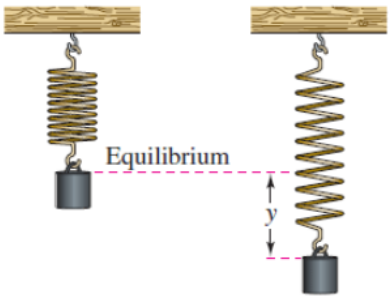
48. 0/1 points LarTrig10 2.3.089. [3882829]

A weight is oscillating on the end of a spring (see figure). The displacement from equilibrium of the weight relative to the point of equilibrium is given by

$$y = \frac{1}{12}(\cos(8t) - 4\sin(8t)) \overset{\text{SET}}{=} 0 \Rightarrow \cos(8t) - 4\sin(8t) = 0$$

where y is the displacement (in meters) and t is the time (in seconds). Find the times when the weight is at the point of equilibrium ($y = 0$) for $0 \le t \le 1$. (Enter your answers as a comma-separated list. Round your answers to two decimal places.)

$t =$ ✗ 0.03, 0.42, 0.82 s

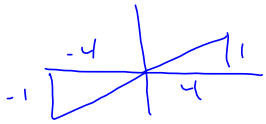


$\cos(8t) - 4\sin(8t) = 0$

$\cos(8t) = 4\sin(8t)$

$\frac{1}{4} = \frac{\sin(8t)}{\cos(8t)} = \tan(8t)$

$\tan(8t) = 0$



$0 \le t \le 1$

$0 \le 8t \le 8$

$8t = \arctan(\frac{1}{4}), \pi + \arctan(\frac{1}{4}), 2\pi + \arctan(\frac{1}{4})$

The 8t's

```
tan⁻¹(1/4)
      .2449786631
Ans+π
      3.386571317
Ans+π
      6.52816397
```

The t's

```
      6.52816397
tan⁻¹(1/4)/8
      .0306223329
Ans+π/8
      .4233214146
Ans+π/8
      .8160204963
```

§2.5 #6

$5\tan(2x) - 5\cot(x) = 0$?

$$5\,\frac{\sin(2x)}{\cos(2x)} - 5\cot(x) = \frac{5(2\sin(x)\cos(x))}{\cos^2(x)-\sin^2(x)} - \frac{5\cos(x)}{\sin(x)}$$

Use $\tan(2u) = \dfrac{2\tan(u)}{1-\tan^2(u)}$:

$$5\left(\frac{2\tan(x)}{1-\tan^2(x)}\right) - 5\cot(x) = 0 \implies$$

$$\frac{2\tan(x)}{1-\tan^2(x)} - \frac{\cos(x)}{\sin(x)} = 0$$

$$\frac{2\tan(x)(\sin(x)) - \cos(x)(1-\tan^2(x))}{(1-\tan^2(x))(\sin(x))} = 0$$

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

$2\tan(x) = \cot(x)(1-\tan^2(x)) = 0$

$2\tan(x) = \cot(x) - \tan(x)$

$3\tan(x) = \cot(x)$

$$\boxed{3\,\frac{\tan(x)}{\cot(x)} = 1}$$

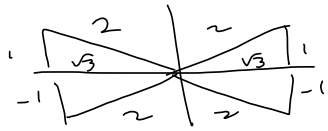
Legal, but loses some sol'ns.

$3\tan^2(x) = 1$

$\tan^2(x) = \frac{1}{3}$

$\tan(x) = \pm\sqrt{\frac{1}{3}}$

$= \pm\frac{1}{\sqrt{3}}$



$$\boxed{\frac{\pi}{6},\ \frac{5\pi}{6},\ \frac{7\pi}{6},\ \frac{11\pi}{6}}$$

$3\tan(x) = \cot(x)$

$\implies 3\tan(x) - \cot(x) = 0$

$\implies 3\tan(x) - \dfrac{1}{\tan(x)} = 0$

$$\implies \frac{3\tan^2(x) - 1}{\tan(x)} = 0$$

$$\implies \cot(x)\left(3\tan^2(x) - 1\right) = 0$$

$\cot(x) = 0$

$x = \frac{\pi}{2}, \frac{3\pi}{2}$ — I would've missed.