

8.  $y = \sin x + \frac{1}{4} \sin 2x$

DOMAIN:  $(-\infty, \infty)$

X-INT:  $0 = \sin x + \frac{1}{4} \sin 2x$

$0 = \sin x + \frac{1}{4} \cdot 2 \sin x \cos x$

$0 = \sin x + \frac{1}{2} \sin x \cos x$

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

$\sin x = 0 \quad 1 + \frac{1}{2} \cos x = 0$

$X = 0, \pi, 2\pi$   
 $\frac{1}{2} \cos x = -1$   
 ~~$\cos x = -2$~~

Y-INT:  $y = \sin 0 + \frac{1}{4} \sin(2 \cdot 0)$

$y = 0 + \frac{1}{4}(0)$

$y = 0$

ASYMPTOTES: NONE

$y' = \cos x + \frac{1}{4} \cos(2x) - \frac{d}{dx}(2x)$

$= \cos x + \frac{1}{4} \cdot 2 \cos(2x)$

$= \cos x + \frac{1}{2} \cos(2x)$

$\cos x + \frac{1}{2} \cos(2x) = 0$

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

$\cos x + \cos^2 x - \frac{1}{2} = 0$

$\cos^2 x + \cos x - \frac{1}{2} = 0$

$\rightarrow 2 \cos^2 x + 2 \cos x - 1 = 0$

$a = 2 \quad b = 2 \quad c = -1$

$\cos x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

$\cos x = \frac{-2 \pm \sqrt{2^2 - 4(2)(-1)}}{2(2)}$

$\cos x = \frac{-2 \pm \sqrt{4+8}}{4}$

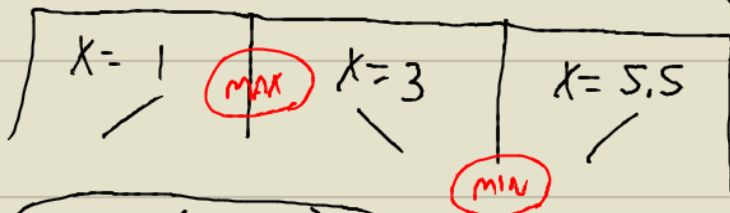
$\cos x = \frac{-2 \pm \sqrt{12}}{4}$

$\cos x = \frac{-2 \pm 2\sqrt{3}}{4}$

$\cos x = \frac{-1 \pm \sqrt{3}}{2}$

$x = \arccos\left(\frac{-1 \pm \sqrt{3}}{2}\right)$   
 $= \cos^{-1}\left(\frac{-1 \pm \sqrt{3}}{2}\right)$

0       $x = 1.2$        $x = 5.1$        $2\pi$



INC  $(0, 1.2)$   
 DEC  $(1.2, 5.1)$   
 INC  $(5.1, 2\pi)$

MAX:  $(1.2, 1.1)$   
 MIN:  $(5.1, -1.1)$