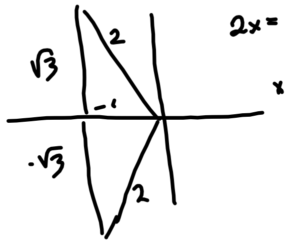
$g(x) = \sin(2x) + x \overset{SET}{=} 0: \quad x = 0$

$g'(x) = 2\cos(2x) + 1 \overset{SET}{=} 0$

$\cos(2x) = -\frac{1}{2}$ on $[0, 2\pi]$

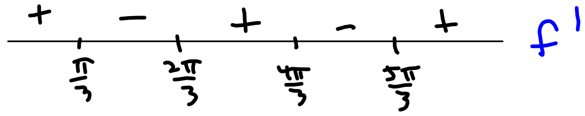
Want all $x \in [0, 2\pi] \longrightarrow$

$2x \in [0, 4\pi]$



$2x = \frac{2\pi}{3}, \frac{4\pi}{3}, \frac{8\pi}{3}, \frac{10\pi}{3}$

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



Tests:

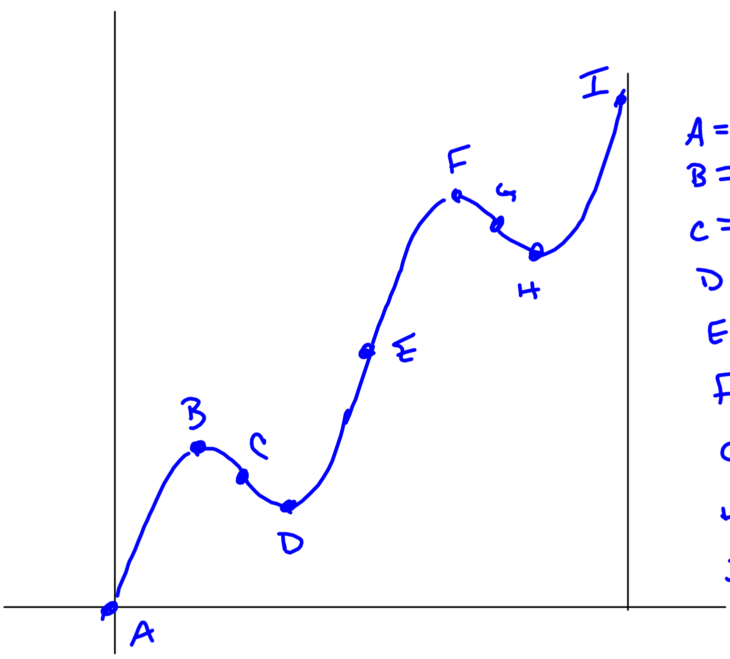
$x = 0 \qquad 2\cos(2(0)) + 1 = +$

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

$x = \pi \qquad 2\cos(2\pi) + 1 = +$

$x = \frac{3\pi}{2} \qquad 2\cos(3\pi) + 1 = -$

$x = 2\pi \qquad = +$

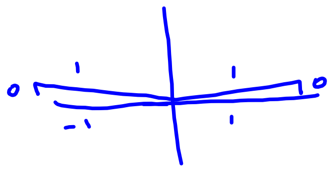


A = (0,
B = ($\frac{\pi}{3}$) MAX
C = ($\frac{\pi}{2}$,) IP
D = ($\frac{2\pi}{3}$ MIN
E = (π, IP
F = ($\frac{4\pi}{3}$, MAX
G = ($\frac{3\pi}{2}$, IP
H = ($\frac{5\pi}{3}$, MIN
I = IP
J =

Midterm Re-Take:

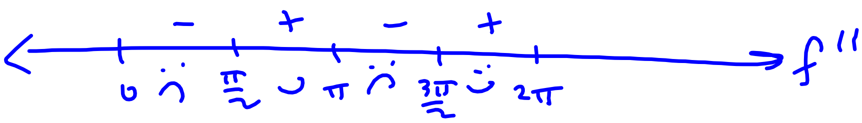
Send me your desired time to take it. You have 2 weeks from today to make arrangements.

$-4\sin(2x)=0$



$2x = 0, \pi, 2\pi, 3\pi, 4\pi$

$x = 0, \frac{\pi}{2}, \pi, \frac{3\pi}{2}, 2\pi$

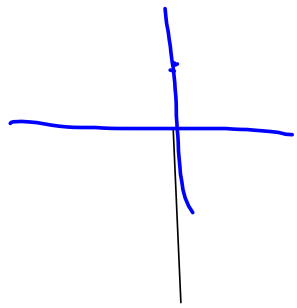


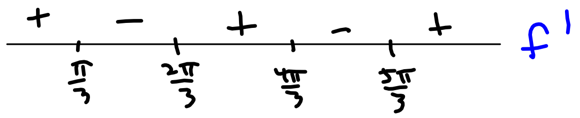
$\frac{\pi}{4}$ $\quad -4\sin(2(\frac{\pi}{4})) = -$

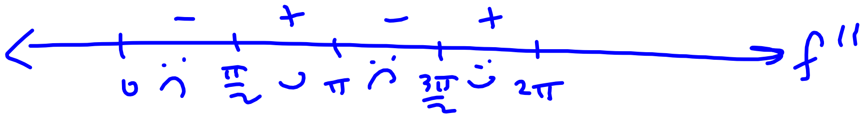
$\frac{3\pi}{4}$ $\quad -4\sin(\frac{3\pi}{2}) = +$

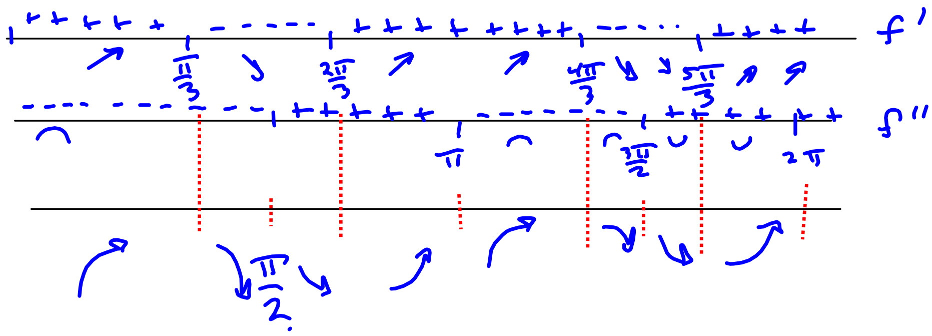
$\frac{5\pi}{4}$ $\quad -4\sin(\frac{5\pi}{2}) = -$

$\frac{7\pi}{4}$ $\quad -4\sin(\frac{7\pi}{2}) = +$




f'


f''


f'
f''

§3.7 #9

11 m of wire to be made into a square and an equilateral triangle. (After we cut it!)

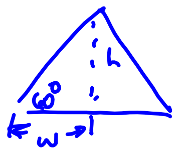
~~What length fo~~ How much wire for the square?

Area = A (in m^2)

Let x = length of wire used for the square. (in m)

Then $11-x$ = " " " " " " triangle (in m)

Then area $= \left(\frac{x}{4}\right)^2 = A_S$

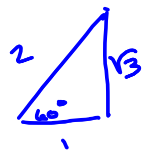


$\frac{11-x}{3}$ = length of a side

$\frac{11-x}{6} = w$

$\frac{h}{w} = \tan 60° = \sqrt{3}$

$h = w\sqrt{3} = \frac{11-x}{6} \cdot \sqrt{3}$



$A_T = \frac{1}{2} b h = \frac{1}{2}\left(\frac{11-x}{3}\right)\left(\frac{11-x}{4}\right)\sqrt{3}$

$$A(x) = A_S + A_T = \left(\frac{x}{4}\right)^2 + \frac{1}{2}\left(\frac{(11-x)^2}{18}\right)\sqrt{3} = \frac{x^2}{16} + \frac{\sqrt{3}}{36}(x-11)^2$$

$$A'(x) = \frac{x}{8} + \frac{\sqrt{3}}{36}\left(2(x-11)\right) \overset{\text{SET}}{=} 0$$

$$\Rightarrow \left[\frac{x}{8} + \frac{\sqrt{3}}{18}(x-11) = 0\right] \xrightarrow{\text{TIMES } 72}$$

$2\cdot2\cdot2 \quad 2\cdot3\cdot3$

$2\cdot2\cdot2\cdot3\cdot3$

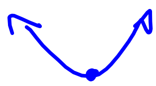
$$9x + 4\sqrt{3}(x-11) = 0$$

$$9x + 4\sqrt{3}x - 44\sqrt{3} = 0$$

$$(9+4\sqrt{3})x = 44\sqrt{3}$$

$$x = \frac{44\sqrt{3}}{9+4\sqrt{3}}$$ Corresponds to min.

Area $= ax^2 + \ldots$



has one minimum

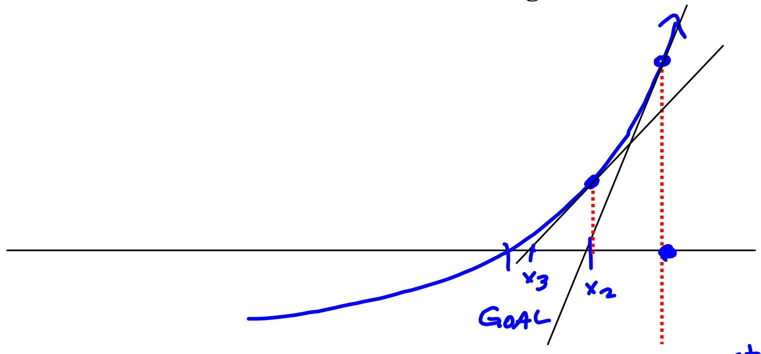
To maximize it on $[0, 11]$

Check endpoints:

$A(0)$

$A(11)$

Another Crack at Newton's Method with the right screen!!!



Tangent Line:

$L(x) = f'(x_1)(x - x_1) + f(x_1)$

x_2 will be the x-coordinate of the x-intercept:

$f'(x_1)(x_2 - x_1) + f(x_1) = 0$ $\longrightarrow$

$f'(x_1)(x_2 - x_1) = -f(x_1)$ $\longrightarrow$

$x_2 - x_1 = -\dfrac{f(x_1)}{f'(x_1)}$ $\longrightarrow$

$x_2 = x_1 - \dfrac{f(x_1)}{f'(x_1)}$

$x_{n+1} = x_n - \dfrac{f(x_n)}{f'(x_n)}$