Period 1, March 12, 2025

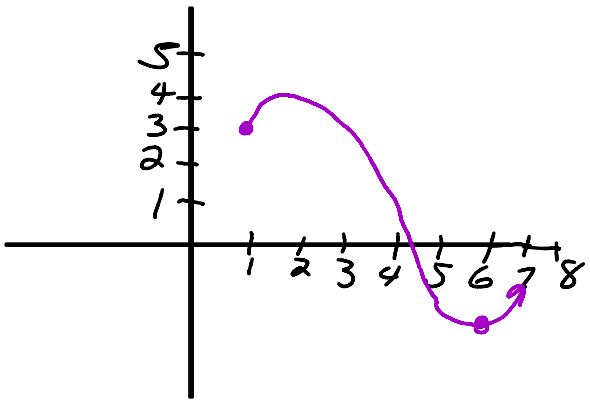
$F(1) = ?$

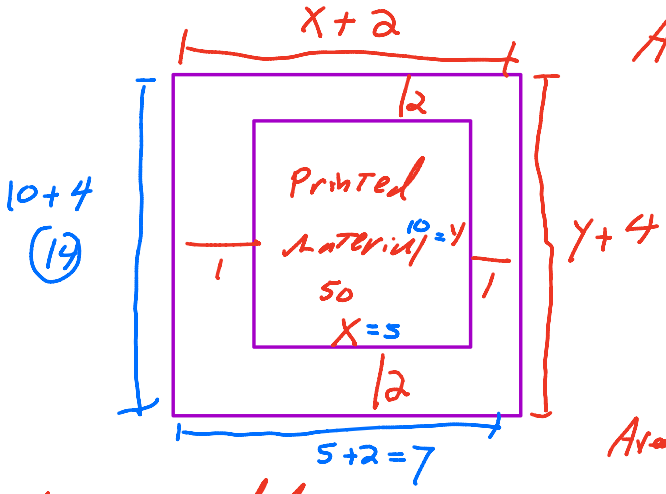
$F'(x) > 0$ $(1,2)(6,7)$ up work

$F'(x) \leq 0$ $[2,6)$ downward

$F''(x) > 0$ $(5,7)$ concave up

$F''(1) < 0$ $(1,5)$ concave Down





$\text{Area} = (x+2)(y+4)$

$x \cdot y = 50$

$x = \frac{50}{y}$ $\Rightarrow x = \frac{50}{10} = 5$

$A = \left(\frac{50}{y} + 2\right)(y+4)$

$\text{Area} \quad \frac{50}{y} \cdot y + \frac{50}{y} \cdot 4 + 2 \cdot y + 2 \cdot 4$

Max / Min $\frac{dA}{dy} = 0$

$A = 50 + 200y^{-1} + 2y + 8$

$\frac{dA}{dy} = 0 + 200(-1)y^{-1-1} + 2 + 0$

$0 = \frac{-200}{y^2} + 2$

$\frac{200}{y^2} = 2$

$200 = 2y^2$

$\frac{200}{2} = \frac{2y^2}{2}$

$100 = y^2$

$10 = y$

Printed Material $= 32$

$x \cdot y = 32 \Rightarrow \frac{32}{y} = x \Rightarrow \frac{32}{x} = y$

$(x+2)(y+4) = A$ $\quad \frac{32}{4} = y$

$\left(x+2\right)\left(\frac{32}{x} + 4\right) = A$ $\quad 8 = y$

$x \cdot \frac{32}{x} + x \cdot 4 + 2 \cdot \frac{32}{x} + 2 \cdot 4 = A$

$32 + 4x + 64x^{-1} + 8 = A$

$0 + 4 - 64x^{-2} + 0 = \frac{dA}{dx} = 0$

$4 - \frac{64}{x^2} = 0$

$x^2 \cdot 4 = \frac{64}{x^2} \cdot x^2$

$\frac{4x^2}{4} = \frac{64}{4}$

$x^2 = 16$

$x = 4$

$8 + 4 = 12$

$4 + 2 = 6$

$F'(x) = (x-1)^2(x+3) = 0 \quad x = 1, -3$

$F''(x) = 2(x-1)(1)(x+3) + (x-1)^2 \cdot 1$

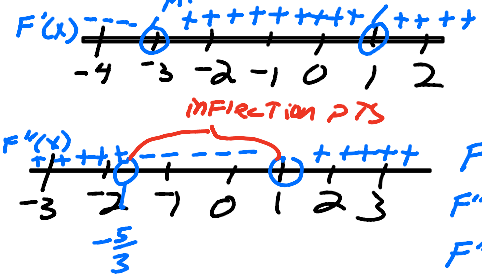
$= (x-1)(2(x+3) + x - 1)$

$F''(x) = (x-1)(2x+6+x-1)$

$F''(x) = (x-1)(3x+5) = 0 \Rightarrow x = 1, -\frac{5}{3}$

Max/Min $F'(x) = 0$ or $\emptyset$

inflection pt $F''(x) = 0$



$F'(-4) = (-4-1)^2(-4+3)$

$F'(0) = (0-1)^2(0+3)$

$F'(2) = (2-1)^2(2+3)$

$F''(-2) = (-2-1)(3(-2)+5) = -3 \cdot -1$

$F''(0) = (0-1)(3 \cdot 0 + 5) = -1 \cdot 5$

$F''(2) = (2-1)(3 \cdot 2 + 5) = 1 \cdot 11$

$F'(x) = (x-1)(x+3)^2$

$F''(x) = 1(x+3)^2 + (x-1) \cdot 2(x+3) \cdot 1$

$= (x+3)^2 + (x-1) \cdot 2(x+3)$

$(x+3)[(x+3) + 2(x-1)]$

$(x+3)[x+3+2x-2]$

$F''(x) = (x+3)(3x+1)$

$F'(x) = 0 \quad x = 1, -3$

$F''(x) = 0 \quad x = -3 \text{ or } -\frac{1}{3}$

set up Tests

No Max

Min $x = 1$

inflection $x = -3, -\frac{1}{3}$

$F'(x) > 0$

$\downarrow$

increasing

$F''(x) < 0$

$\downarrow$

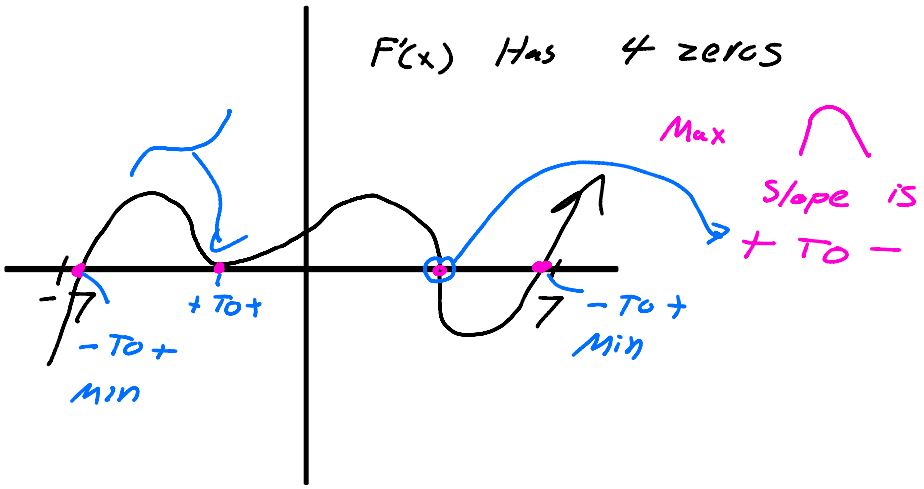
(concave Down = (increasing by Less)

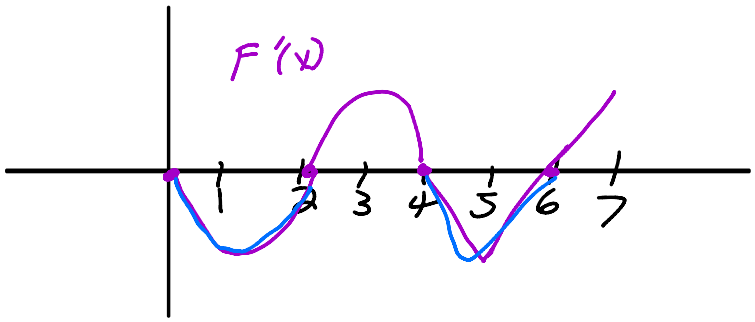
x	y	
-1	4	
0	5	Same +1
1	6	Same +1

x	y	
-1	4	+1
0	5	+2
1	7	

increasing by more

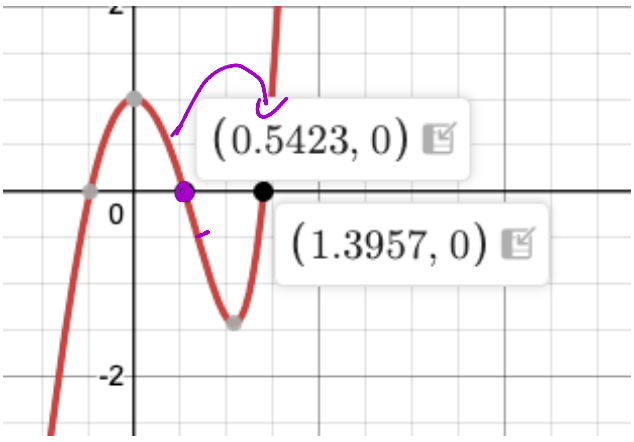
x	y	
-1	4	+2
0	6	+1
1	7	





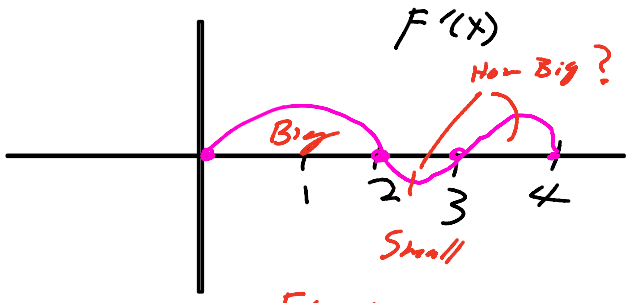
decreasing

(0,2) ∪ (4,6)



$F'(x) = x^3 - 4\sin(x^3) + 1$

Max ∩ Slope From + To −



F(x) increasing (0,2) (3,4)

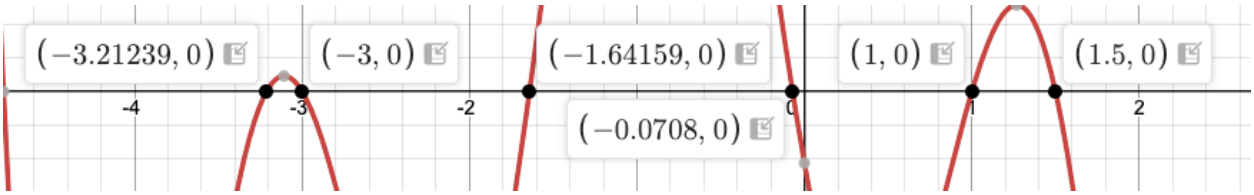
decreasing (2,3)

C d increasing (0,2)

F(x) is not Negative at x=3

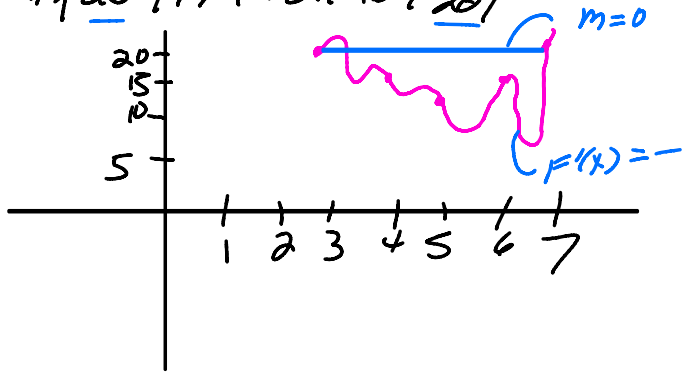
always be +

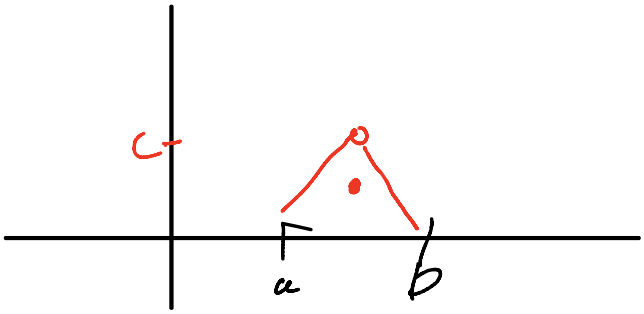
$F'(x) = (3-2x-x^2)\sin(2x-3)$

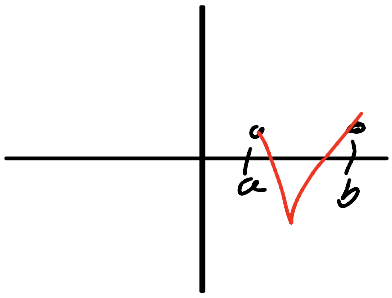


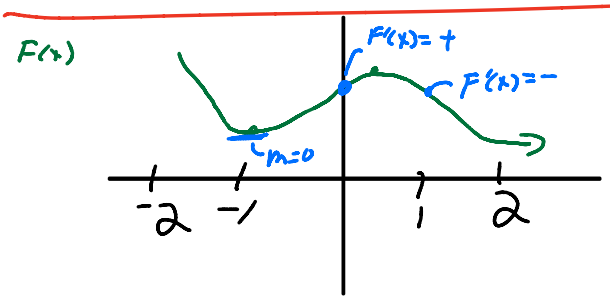
Six

X	3	4	5	6	7
F(x)	20	17	12	16	20









$F'(x)$ = Slope of $F(x)$

$F'(-1)=0$

$F'(0)=+$

$F'(1)=-$

$F'(1) < F'(-1) < F'(0)$

$F(x)=x^3-x+2$

$F(2)=2^3-2+2=8$

$F(1.9)$ $\quad y=x^3-x+2$

How far is 1.9 From 2

$dx=-0.1$

Change in y From $x=2$

$\frac{dy}{dx}=(3x^2-1)dx$

$dy=(3(2)^2-1)(-0.1)$

$11(-0.1)$

$dy=-1.1$

$F(1.9)\approx 8-1.1=6.9$

$F'(x)=3x^2-1 \Rightarrow F''(x)=6x$ when $x=2$ concave up

under