4.4 Day 1

Sunday, November 18, 2012
7:01 PM

AP Prep p. 218: 1-4
p. 226: 2, 5, 9

AP Prep

1. $f'(x) = 5(x-2)^4(x+3)^4 + (x-2)^5(4(x+3)^3)$

$= (x-2)^4(x+3)^3\left(5(x+3) + (4(x-2))\right)$

3cv

Ⓒ

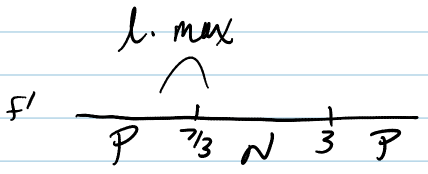
2. $f'(x) = (x-2)(2(x-3)) + (x-3)^2(1)$

$= (x-3)\left((2x-4) + x-3\right)$

$= (x-3)(3x-7) = 0$

$x=3 \quad x=7/3$

Ⓓ



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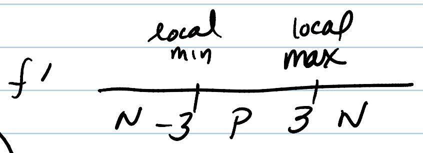


Ⓑ

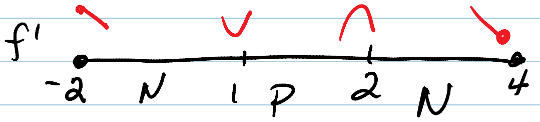
4. $f(x) = 3\ln(x^2+2) - 2x \quad [-2,4]$ Domain

$f'(x) = \frac{3}{x^2+2}(2x) - 2$

$0 = \frac{6x}{x^2+2} - 2$

$2 = \frac{6x}{x^2+2} \qquad 2x^2+4 = 6x \qquad 2x^2-6x+4=0$

$2(x^2-3x+2)=0 \qquad 2(x-2)(x-1)=0$



* check endpoints!!!!

a Local max @ $x=-2$ and $x=2$ local min @ $x=1$ and $x=4$

b. $f'(x) = \frac{6x}{x^2+2} - 2$ $\qquad f''(x) = \frac{(x^2+2)(6) - 6x(2x)}{(x^2+2)^2} = \frac{6x^2+12-12x^2}{(x^2+2)^2}$

points of inflection $\qquad = \frac{-6x^2+12}{} \qquad -6x^2+12=0$

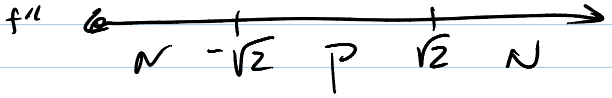
points of inflection @ $x = \pm\sqrt{2}$

$$= \frac{-6x^2+12}{(x^2+2)^2}$$

$-6x^2+12=0$

$-6x^2=-12$

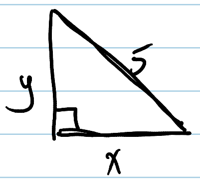
$x^2= 2$ $\quad x=\pm\sqrt{2}$



C. The absolute max is @ $x=-2$ and $f(x) = 3\ln 6+4$

4.4

2.



$x^2+y^2=25$

$y=\sqrt{25-x^2}$

$A=\frac{1}{2}xy = \frac{1}{2}x\left(\sqrt{25-x^2}\right)$

Domain $[0,5]$

$A= \frac{1}{2}x\,(25-x^2)^{1/2}$

$A'= \frac{1}{2}x\left(\frac{1}{2}(25-x^2)^{-1/2}\cdot(-2x)\right) + \frac{1}{2}\sqrt{25-x^2}$

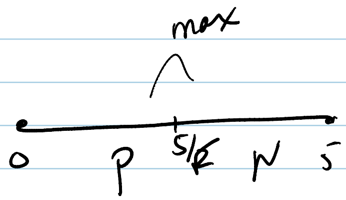
$= \frac{-x^2}{2\sqrt{25-x^2}} + \frac{\sqrt{25-x^2}}{2}$

$= \frac{-x^2+25-x^2}{2\sqrt{25-x^2}} = \frac{-2x^2+25}{2\sqrt{25-x^2}}$

$0= -2x^2+25$

$\frac{-25}{-2}= x^2$

$x=\pm\frac{5}{\sqrt{2}}$



$x=\frac{5}{\sqrt{2}}$ cm

$y= 5/2$ cm

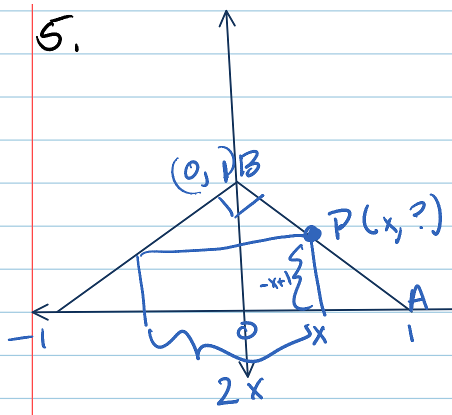
largest area $\frac{25}{4}$ cm^2

$y=\sqrt{25-\left(\frac{5}{\sqrt{2}}\right)^2}$

$= \sqrt{25-\frac{25}{2}} = \sqrt{\frac{50-25}{2}} = \sqrt{\frac{25}{2}} = \frac{5}{\sqrt{2}}$

$A=\frac{1}{2}\left(\frac{5}{\sqrt{2}}\right)\left(\frac{5}{\sqrt{2}}\right)=\frac{25}{4}$

5.



$y = \boxed{-x+1}$

a $P(x, \boxed{-x+1})$

b. $A(x) = 2x(-x+1)$

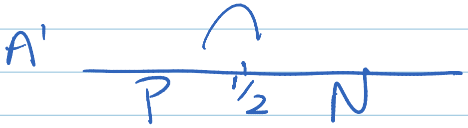
$A(x) = -2x^2 + 2x$

c. $A'(x) = -4x + 2$

$0 = -4x + 2$

$-2 = -4x$

max $x = 1/2$



Dimensions of the rectangle

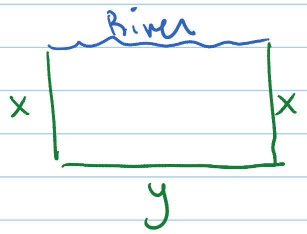
$2(\frac{1}{2}) = 1$ $y = -\frac{1}{2} + 1 = 1/2$

$\frac{1}{2}$ unit by 1 unit

max area

$A(1/2) = 1 \cdot 1/2 = 1/2$ square units

9.



$A = xy$

$2x + y = 800$

$y = 800 - 2x$

$A = x(800 - 2x)$

$= 800x - 2x^2$

$A' = 800 - 4x$

$0 = 800 - 4x$

$800 = 4x$

$x = 200$ m

dimensions

200 x 400 meters

$A = 80,000 \text{ m}^2$ max area