5/5/15

Cinco de Mayo Notes

Scan the review for exam paper

Scan yesterday's notes and finish them with the A-Team at board.

Start Todays notes by continuing with #13 on review sheet

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

$\cancel{f'(x) = 2(x^2+x)(2x+1)+}$

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

$\boxed{f'(x) = 2(2x+1)^2(x^2+x)\left[3(x^2+x) + (2x+1)^2\right]}$

" " " $3x^2+3x+4x^2+4x+1$

OR " " " $7x^2+7x+1$

$\boxed{f'(x) = 2(2x+1)^2(x^2+x)(7x^2+7x+1)}$

** Sherlock Holmes & Watson Group — Group 3 To Board

30. $f(t) = \dfrac{\sqrt{2t+1}}{(t+1)^3}$

30. cont. $f(t) = \dfrac{(2t+1)^{1/2}}{(t+1)^3}$

$$f'(t) = \frac{(t+1)^3\left(\frac{1}{2}\right)(2t+1)^{-1/2}(2) - (2t+1)^{1/2}(3)(t+1)^2(1)}{\left((t+1)^3\right)^2}$$

$$f'(t) = \frac{(2t+1)^{-\frac{1}{2}}(t+1)^2\left[\overset{t+1\;-6t\;-3}{(t+1) - 3(2t+1)^1}\right]}{(t+1)^6}$$

$$\boxed{f'(t) = \frac{(2t+1)^{-\frac{1}{2}}\cancel{(t+1)^2}\left[-5t-2\right]}{(t+1)^{\cancel{6}\,4}}}$$

OR

$$\boxed{f'(t) = -\frac{(5t+2)}{\sqrt{2t+1}\,(t+1)^4}}$$

33. $h(t) = \dfrac{t}{t^2+4}$ find $h''(t) = ?$

$$h'(t) = \frac{(t^2+4)(1) - \overset{-2t^2}{t(2t)}}{(t^2+4)^2} = \frac{(4-t^2)}{(t^2+4)^2}$$

$$h''(t) = \frac{(t^2+4)^2(-2t) - (4-t^2)(2)(2t)(t^2+4)}{(t^2+4)^4} =$$

33. cont.

$$h''(t) = \frac{-2t\,\cancel{(t^2+4)}\left[\overbrace{(t^2+4)}^{t^2+4} + \overbrace{2(4-t^2)}^{+8-2t^2}\right]}{(t^2+4)^{\cancel{4}\,3}}$$

$$\boxed{h''(t) = \frac{-2t(-t^2+12)}{(t^2+4)^3} \quad \text{OR} \quad \frac{2t(t^2-12)}{(t^2+4)^3}}$$

40. Find $\frac{dy}{dx}$ (or y') by implicit differentiation (Note: I use y' instead of $\frac{dy}{dx}$)

$$x^2 + 2x^2y^2 + y^2 = 10$$

Hint: Remember to use product rule on middle term $(2x^2)(y^2)$

$$2x + y^2(4x) + 2x^2(2yy') + 2yy' = 0$$

$$2x(1+2y^2) + 2yy'(2x^2+1) = 0$$

$$y' = \frac{-2x(1+2y^2)}{2y(2x^2+1)} = \boxed{-\frac{x(1+2y^2)}{y(2x^2+1)}}$$

Brady Bunch Group 1

Counts as 2 problems

STill Chapter 3 (last problem of Chap. 3) Story Problem

53. U.K. Digital Video Viewers:

Digital video viewing is one of The Top online activities amoung U.K. Internet users. IT is expected That between 2012 and 2017, The U.K. digital video audience will be given by

$$N(t) = 65.71t^{0.085} \quad (2 \le t \le 7)$$

where $N(t)$ is measured in millions and t is measured in years, with $t=2$ being 2012.

a. How many U.K. digital video viewers will ~~Be~~ There be in 2015?

b. How fast was The U.K. digital video audience expected To be changing in 2015?

answers: a)

$t = 2$ is 2012
$t = 3$ is 2013
$t = 4$ is 2014
$t = 5$ is 2015

So $N(5) = 65.71(5)^{0.085}$

$N(5) \doteq$ [redacted] 75.3 million

b). $N(t) = 65.71t^{0.085}$

$N'(t) = 65.71(0.085)t^{(0.085-1)} = 5.58535t^{-0.915}$

$N'(5) = 65.7(0.085)(5)^{-0.915} \doteq \boxed{1.28 \frac{\text{million}}{\text{YR}}}$

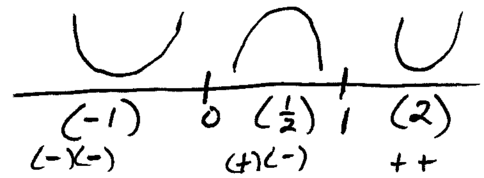
Note: each of these would count as two problems

Chapter 4 Pg 286 (34, 42, 52, 64, 78)

Find where graph is concave upward/downward

34. $f(x) = 3x^4 - 6x^3 + x - 8$

$f'(x) = 12x^3 - 18x^2 + 1$



$f''(x) = 36x^2 - 36x$

$36x(x-1) = 0$

$x = 0$ OR $x = 1$

$\boxed{\text{so concave upward } (-\infty, 0) \text{ and } (1, \infty) \quad \text{Concave downward } (0, 1)}$

42. Again Concavity? $g(x) = \frac{x}{(1+x^2)}$

$$g'(x) = \frac{\overset{1+x^2}{(1+x^2)(1)} - \overset{-2x^2}{(x)(2x)}}{(1+x^2)^2} = \frac{(1-x^2)}{(1+x^2)^2}$$

$$g''(x) = \frac{(1+x^2)^2(-2x) - (1-x^2)(2)(1+x^2)(2x)}{(1+x^2)^4}$$

$$g''(x) = \frac{(-2x)\cancel{(1+x^2)}\overset{1+x^2+2-2x^2}{[(1+x^2) + (1-x^2)(2)]}}{(1+x^2)^{\cancel{4}\ 3}}$$

$$g''(x) = \frac{(-2x)(3-x^2)}{(1+x^2)^3} = 0$$

so $x = 0$ or $3 - x^2 = 0$

$x = \pm\sqrt{3}$

$\boxed{\text{Concave upward } (-\sqrt{3}, 0] \text{ and } (\sqrt{3}, \infty) \quad \text{Concave downward } (-\infty, -\sqrt{3}) \text{ and } (0, \sqrt{3})}$