Notes for class 5/4/15

1) Hand back Papers
2) Handout - Go over
3) Hmwk 6.3 & 6.4

4. Board Work (Brady Bunch) Group 1

Page 157 (4, 8, 12, 16, 19, 24)

#4 Let $f(x) = 2x^2 - x + 1$ Find:

a. $f(x-1) + f(x+1)$

$2(x-1)^2 - (x-1) + 1 + 2(x+1)^2 - (x+1) + 1$

$2(x^2 - 2x + 1) - x + 1 + 1 + 2(x^2 + 2x + 1) - x - 1 + 1$

$2x^2 - 4x + 2 - x + 1 + 1 + 2x^2 + 4x + 2 - x - 1 + 1$

$4x^2 - 2x + 6$ or $2(2x^2 - x + 3)$

b. $f(x+2h)$

$2(x+2h)^2 - (x+2h) + 1$

$2(x^2 + 4xh + 4h^2) - x - 2h + 1$

$2x^2 + 8xh + 8h^2 - x - 2h + 1$

$2x^2 + 8xh + 8h^2 - x - 2h + 1$

Pg 157 (8, 12, 16, 19, 24)

8. Find the rules for the composite functions $f \circ g$ and $g \circ f$

a. $f(x) = 2x - 1$; $g(x) = x^2 + 4$

$f \circ g =$ $g \circ f =$

$f \circ g = 2(x^2+4) - 1$
$f \circ g = 2x^2 + 8 - 1$
$f \circ g = 2x^2 + 7$

$g \circ f = (2x-1)^2 + 4$
$4x^2 - 4x + 1 + 4$
$4x^2 - 4x + 5$

b. $f(x) = 1 - x$; $g(x) = \frac{1}{(3x+4)}$

$f \circ g =$

$f \circ g = 1 - \frac{1}{3x+4}$

$f \circ g = \frac{3x+4}{3x+4} - \frac{1}{3x+4}$

$f \circ g = \frac{3x+4-1}{3x+4}$

$f \circ g = \frac{3x+3}{3x+4} = \frac{3(x+1)}{3x+4}$

$g \circ f = \frac{1}{3(1-x)+4}$

$g \circ f = \frac{1}{3-3x+4}$

$\boxed{g \circ f = \frac{1}{7-3x}}$

Pg 157

8. c.) $f(x) = x-3$ $\quad g(x) = \dfrac{1}{\sqrt{x+1}}$

$f \circ g =$

$$f \circ g = \frac{1}{\sqrt{x+1}} - 3$$

OR

$$f \circ g = \frac{1-3\sqrt{x+1}}{\sqrt{x+1}}$$

$g \circ f =$

$$g \circ f = \frac{1}{\sqrt{x-3+1}}$$

$$g \circ f = \frac{1}{\sqrt{x-2}} \quad \text{OR} \quad \boxed{\frac{\sqrt{x-2}}{x-2}}$$

* A-Team To Board

Pg 157 Find The indicated limits, if They exist

#12 $\lim\limits_{x \to 1} (x^2+1)$

$$= (1^2+1) = 1+1 = 2$$

16. $\lim\limits_{x \to -2} \dfrac{(x^2-2x-3)}{(x^2+5x+6)}$

$$= \frac{\overline{\quad}}{(-2)^2+5(-2)+6} \quad \text{or} \quad \frac{(x-3)(x+1)}{(x+2)(x+3)}$$

$4-10+6$

0

$(-2+2)(\;-\;)$

0

does not exist

#19. $\lim\limits_{x \to 1^+} \dfrac{(x-1)}{x(x-1)}$

$$= \lim_{x \to 1^+} \frac{1}{x} = 1$$

#24 $\lim\limits_{x \to -\infty} \dfrac{x^2}{(x+1)}$

$$= \lim_{x \to -\infty} \frac{\frac{x^2}{x}}{\frac{x}{x}+\frac{1}{x}} = \lim_{x \to -\infty} \frac{x}{1+\frac{1}{x}}$$

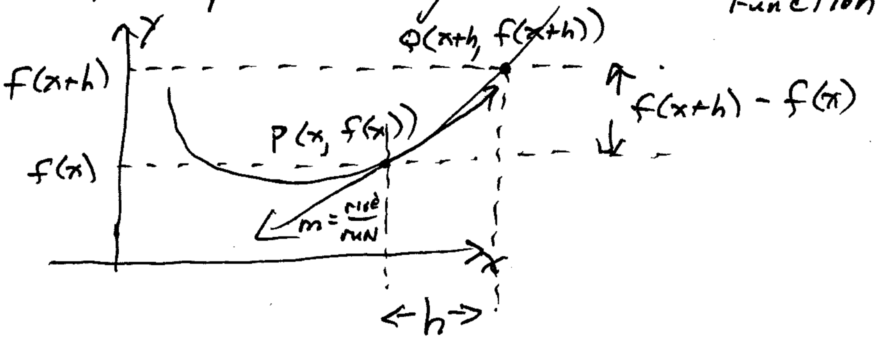
$= -\infty$, so The limit does not exist as it does not approach a #.

* Sherlock & Watson Team (Group 3)

Note: Have to use the definition of derivative of a function!

Pg. 143 Definition of Slope of a Tangent Line (Derivative of a Function)

What is it? (memorize it)



** $$f'(x) = \lim_{h \to 0} \frac{f(x+h) - f(x)}{h}$$

Example 4 Let $f(x) = x^2 - 4x$

$f'(x) =$ Note: What should the answer be when done

$$f'(x) = \lim_{h \to 0} \frac{\left[(x+h)^2 - 4(x+h)\right] - (x^2 - 4x)}{h}$$

$$f'(x) = \lim_{h \to 0} \frac{x^2 + 2xh + h^2 - 4x - 4h - x^2 + 4x}{h} = \lim_{h \to 0} \frac{h^2 + 2xh - 4h}{h}$$

$$f'(x) = \lim_{h \to 0} \frac{h(h + 2x - 4)}{h} = \lim_{h \to 0} (h + 2x - 4) = 2x - 4$$

$$f'(x) = 2x - 4$$

S's & Watson Group 3 (cont.)

Chap. 3 Pg 247 (8, 12, 17, 23) for Today

8. $g(s) = 2s^2 - \frac{4}{s} + \frac{2}{\sqrt{s}}$

$g'(s) =$

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

$g'(s) = 4s + 4s^{-2} - s^{-\frac{3}{2}}$

OR $\boxed{g'(s) = 4s + \frac{4}{s^2} - \frac{1}{s^{3/2}}}$

12. $h(t) = \frac{\sqrt{t}}{\sqrt{t}+1}$

$h'(t) =$

$h(t) = \frac{t^{1/2}}{(t^{1/2}+1)}$

quotient rule

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

$h'(t) = \frac{\frac{1}{2}t^0 + \frac{1}{2}t^{-\frac{1}{2}} - \frac{1}{2}t^0}{(t^{\frac{1}{2}}+1)^2} = \frac{\frac{1}{2} - \frac{1}{2} + 1}{2\sqrt{t}(\sqrt{t}+1)^2}$

$h'(t) = \boxed{\frac{1}{2\sqrt{t}(\sqrt{t}+1)^2}}$

17. $f(x) = (3x^3 - 2)^8$

$f'(x) = 8(9x^2)(3x^3-2)^7$

$f'(x) = 72x^2(3x^3-2)^7$

23. $h(x) = (x + \frac{1}{x})^2$

$h(x) = (x + x^{-1})^2$

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

$h'(x) = 2\left(\frac{(x^2+1)}{x}\right)\left(\frac{(x^2-1)}{x^2}\right)$

OR $\boxed{h'(x) = \frac{2(x^2+1)(x^2-1)}{x^3}}$