5/6/15 Review for Semester Final Cont.

** Note: Review for final sheet updated showing 33 kept problems
We did This problem yesterday at the end of the period but lets take a look at it quick.

#52. Pg 286 Find the inflection point.

$$g(x) = 2x^3 - 3x^2 + 18x - 8$$
$$g'(x) = 6x^2 - 6x + 18$$
$$g''(x) = 12x - 6$$
$$12x - 6 = 0$$
$$6(2x-1) = 0$$
$$2x - 1 = 0 \quad \text{so} \quad 2x = 1$$
$$\boxed{x = \tfrac{1}{2}} \quad \text{find } g(\tfrac{1}{2})$$
$$g(\tfrac{1}{2}) = 2(\tfrac{1}{2})^3 - 3(\tfrac{1}{2})^2 + 18(\tfrac{1}{2}) - 8 = 2(\tfrac{1}{8}) - 3(\tfrac{1}{4}) + 9 - 8$$
$$= \tfrac{2}{8} - \tfrac{3}{4} + 1$$
$$= \tfrac{2}{8} - \tfrac{6}{8} + \tfrac{8}{8} = \tfrac{4}{8} = \boxed{\tfrac{1}{2}}$$

$\boxed{\text{inflection pt. is } (\tfrac{1}{2}, \tfrac{1}{2})}$

** Sherlock Holmes and Watson Group To Board
#66. Find the relative extrema. (Use 2nd Derivative Test To decide a max or min)

$$f(x) = 2x^3 + 3x^2 - 12x - 4$$

$$f'(x) = 6x^2 + 6x - 12$$
$$6(x^2 + x - 2) = 0$$
$$(x+2)(x-1) = 0$$
$$x = -2 \;;\; x = 1 \quad \text{relative extrema}$$

$$f''(x) = 12x + 6 = 6(2x+1)$$
$$f''(-2) = 6[2(-2)+1] = -18 < 0 \quad \& \quad f''(1) = 6[2(1)+1] = 18 > 0$$

#66. Cont. Pg. 286

$f''(-2) = -18 < 0$ and $f''(1) = 18 > 0$

$f(x) = 2x^3 + 3x^2 - 12x - 4$

$f(-2) = 2(-2)^3 + 3(-2)^2 - 12(-2) - 4$

$f(-2) = 2(-8) + 3(4) - 24 - 4 = -16 + 12 + 24 - 4 = 16$

so $\boxed{f(-2) = 16 \text{ is a relative maximum}}$ $f''(-2) < 0$ sad face

$f(1) = 2(1)^3 + 3(1)^2 - 12(1) - 4 = 2 + 3 - 12 - 4 = -11$

$\boxed{f(1) = -11 \text{ is a relative minimum}}$ $f''(1) > 0$ happy face

#78 Pg. 286 Sketch the graph

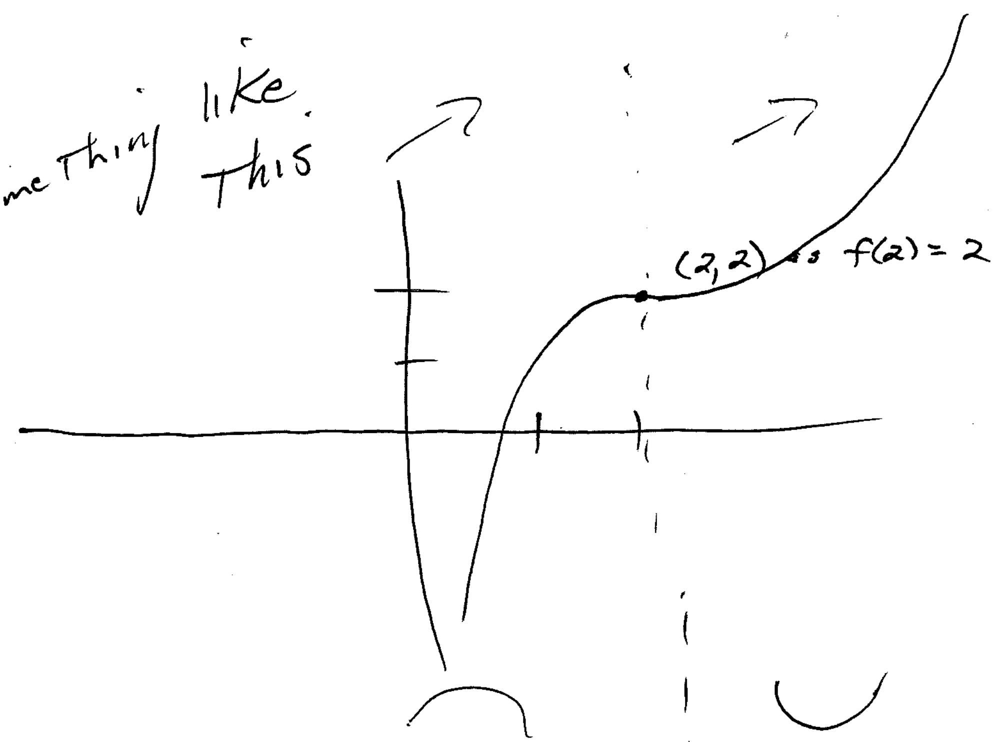
$f(2) = 2$

$f'(2) = 0$

$f'(x) > 0$ on $(-\infty, 2)$; $f''(x) < 0$ on $(-\infty, 2)$

$f'(x) > 0$ on $(2, \infty)$; $f''(x) > 0$ on $(2, \infty)$

Something like this



5/6/15

19 Pg. 314 Find absolute max & min (if any)

$$f(x) = x^3 + 3x^2 - 1 \text{ on } [-3, 2]$$

$f'(x) = 3x^2 + 6x$

$3x^2 + 6x = 0$

$3x(x+2) = 0$

$x = 0 \;;\; x = -2$

$f(-3) = \overset{-27+27-1}{-1}$		
*	$\boxed{f(2) = \overset{8+12-1}{19}}$	absolute Max
$f(0) = -1$		
$f(-2) = \overset{-8+12-1}{3}$		

* $\boxed{\text{both } f(-3) = f(0) = -1 \text{ are absolute minimums}}$

* Brady Bunch To Board (Group!)

Pg. 406 # 3 express in logarithmic form

3. $16^{-3/4} = 0.125$

answer: I have memorized $10^2 = 100$, $2 = \log_{10} 100$ so $\boxed{\log_{16}(0.125) = -\frac{3}{4}}$

5 Solve for x

5. $\ln(x-1) + \ln 4 = \ln(2x+4) - \ln 2$

answer:

$$\ln[4(x-1)] = \ln\left[\frac{(2x+4)}{2}\right]$$

so $4(x-1) = \frac{2x+4}{2}$; $8(x-1) = 2x+4$

$8x - 8 = 2x + 4$

$6x = 12$ so $x = 2$

(opps, The 1st problem of set)

Pg. 406 #21.

$f(x) = xe^{-x^2}$

$f'(x) = ?$

answer: hint: product rule

$f(x) = xe^{-x^2}$

$f'(x) = e^{-x^2}(1) + x(e^{-x^2})(-2x)$

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

#23 $f(x) = x^2e^x + e^x$

$f'(x) =$

answer: $f'(x) = e^x(2x) + x^2e^x + e^x$

$\boxed{f'(x) = e^x(x^2 + 2x + 1) \text{ OR } e^x(x+1)^2}$

#34 Find The 2nd derivative of $y = x\ln(x)$

$f(x) = x \ln x$ find $f''(x)$

+1 pT

answer: $f'(x) = \ln x\,(1) + x\left(\frac{1}{x}\right) = \boxed{\ln x + 1}$

$\boxed{f''(x) = \frac{1}{x}}$

+2 pTs

5/6/15 notes

* A Team To board

Verify That F is an antiderivative of f.

Pg. 418 #2. $F(x) = xe^{x} + \pi$; $f(x) = e^{x}(1+x)$

solution: $F'(x) = e^{x}(1) + xe^{x} + 0$

$F'(x) = e^{x}(1+x)$ verified

#4. $F(x) = x\ln x - x$; $f(x) = \ln x$

answer:

$F'(x) = \ln x\,(1) + x\left(\frac{1}{x}\right) - 1$

$F'(x) = \ln x + 1 - 1 = \ln x$ verified

**** Find The indefinite integral (10, 14, 16, 18)

#10. $\int \sqrt{2}\,dx$

answers:

$\int \sqrt{2}\,dx = \boxed{\sqrt{2}(x) + C}$

#14. $\int 3t^{-7}\,dt$

$\int 3t^{-7}\,dt = 3\left(\frac{1}{-7+1}\right)t^{(-7+1)} + C$

$= -\frac{3}{6}t^{-6} + C = \boxed{-\frac{1}{2}t^{-6} + C}$

#16. $\int 2u^{3/4}\,du$

answers

$\int 2u^{3/4}\,du = 2\left(\frac{1}{\frac{3}{4}+1}\right)u^{(\frac{3}{4}+1)} + C$

$= 2\left(\frac{1}{(\frac{7}{4})}\right)u^{7/4} + C = \boxed{\frac{8}{7}u^{7/4} + C}$

#18. $\int 3x^{-2/3}\,dx$

$\int 3x^{-2/3}\,dx = 3\left(\frac{1}{(-\frac{2}{3}+1)}\right)x^{(-\frac{2}{3}+1)} + C$

$= 3\left(\frac{1}{\frac{1}{3}}\right)x^{1/3} + C = \boxed{9x^{1/3} + C}$