MATH 1520
Assignment #3
Due: Tuesday, Mar. 17th

1. (15 marks) Find y' if

a) $\ln(x^{1/2}) + (\ln x)^{1/2}$ *b)* $\log_2\left(\frac{x+1}{7+x^2}\right)$

c) $y = 2^{\sqrt[3]{x}} \cdot e^{(x^2+3x+1)}$ *d)* $y = 5 \cdot 7^{\log_{10} e^x)}$

2. The Kyla Company makes helicopters. Their cost and revenue functions are given below.

$C(x) = x^2 - 500x - 10000$

$R(x) = 31x^2 - \frac{x^3}{3} - 1000x$

a) (5 marks) How many units must be sold in order to MINIMIZE cost?
b) (8 marks) How many units must be sold in order to MAXIMIZE profit?
c) (5 marks) What is the point of diminishing returns?

3. a) (7 marks) Find:

y'' if $y = (e^x + 1)^7$.

b) (6 marks) Find:

$y^{(20)}$ if $y = x^{1000}$.

c) (5 marks) If the position of a particle is given by the function below, find the acceleration of the particle at time t=1.

$s(t) = \frac{t^5}{5} - t^3 + 2t + 15$

4. (20 marks) For the function

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

a) Find the domain.
b) Find the location of any x- and y- intercepts.
c) Find the equations of any vertical or horizontal asympototes.
d) Find the intervals of increase/decrease.
e) Find the coordinates of any local maxima/minima.

f) Find the intervals of concave up/concave down.
g) Find the coordinates of any inflection points.
h) Make a sketch of f(x) using the info in a)-g).

5. (20 marks) For the function below

$$f(x)=\frac{(1-2x)(x-2)}{(x-1)^2},\ f'(x)=\frac{-(x+1)}{(x-1)^3},\ f''(x)=\frac{2(x+2)}{(x-1)^4}$$

a) Find the domain.
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6. (9 marks) Find the absolute max and absolute min of
$f(x)=x^4-2x^2+7$ on $[0,2]$.