Name:

Math 122 (Fall '12)

Midterm 2

November 13, 2012

1. (20pts)	
2. (20pts)	
3. (20pts)	
4. (20pts)	
5. (20pts)	
Total (100pts)	

1. (20pts) Find the derivatives for the following functions:

(1) $W = r^3 + 5r - 12$

(2) $y(t) = 5e^{2t} - 3\ln t$

(3) $f(u) = \ln(e^u + u)$

(4) $f(x) = x^3 \cdot e^{x^2+1}$

(5) $q(x) = \frac{1+e^x}{1-e^{-x}}$

(6) $f(x) = x^{2x}$

2. (20pts)
I. Find the equation of the tangent line to $f(x) = (x-1)^3$ at the point $x = 2$.

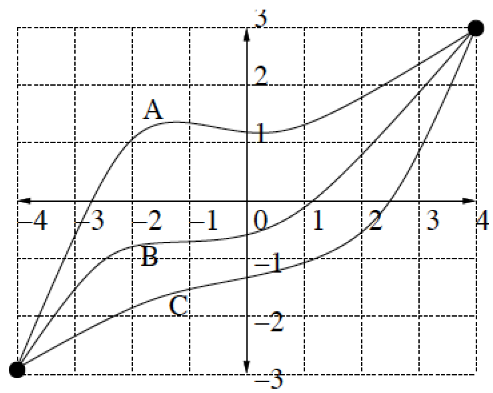
II. The distance (measured in meters), D, of a moving body from a fixed point is given as a function of time (measured in seconds) by $D = 10e^{3t}$.

(i) Find the velocity, v, of the body as a function of t.

(ii) Find the acceleration, a, of the body as a function of t.

(iii) Give units for items (i) and (ii).

3. (20pts)
I. The following graph describes the trajectories of 3 particles A,B, and C.

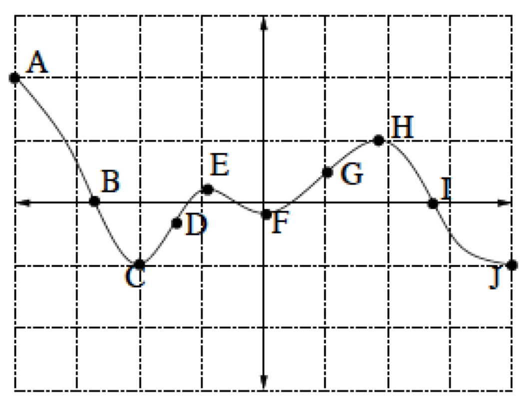


(i) Which particle is moving fastest at time $t = -4$.

(ii) Which particle has a negative velocity at some time?

(iii) At time $t = 1$ is the acceleration of particle A positive or negative?

II. For the following graph, identify: (i) all local max/min, (ii) the global max/min, and (iii) inflection points.



4. (20pts) Consider the function $f(x) = x^4 - 4x^3 + 2$ on the interval $-1 \leq x \leq 4$.

(i) Compute $f'(x)$ and $f''(x)$.

(ii) Find all the critical points of f and decide which are local min/max.

(iii) Find the global maximum and minimum of f.

(iv) Find all the inflection points of f.

(v) Graph the function f (on the given interval)

5. (20pts) True/False or **Fill-in**

(1) The derivative of the product of two functions if the product of their derivatives.

(2) The derivative of the sum of two functions if the sum of their derivatives.

(3) To compute the derivative of x^3e^x, I should use the ________ rule. To compute the derivative of e^{x^3}, I should use the ________ rule

(4) To find the local minima/maxima, I need to compute ________. To find the inflection points, I need to compute ________.

(5) Every critical point of f is either a local maximum or local minimum of f.

(6) If $f'(p) = 0$ and $f''(p) > 0$ then p is a local maximum of f.

(7) If $f'(p) = 0$ and $f''(p) > 0$ then p is a global minimum of f.

(8) Every function has a local minimum.

(9) A global maximum is not necessary a critical point.

(10) If a function $y = f(x)$ has $f'(x) < 0$ for all x in the interval $a \leq x \leq b$, the the global maximum of f on this interval occurs at $x =$____.