MATH 151-D200 Instructor: R. Pyke

Midterm 2, *Version 1*, November 4, 2008

Last Name:	
First Name:	
SFU Student email :	@sfu.ca

1. DO NOT LIFT UP THE COVER PAGE UNTIL INSTRUCTED.
2. Clearly explain your answer. No credit will be given for just writing down the answer.
3. If the answer space provided is not sufficient, write your answer on the back of the previous page.
4. Ordinary Scientific Calculators ONLY are allowed.
   NO GRAPHING CALCULATORS ALLOWED.
5. **Copying someone else's test, or deliberately exposing written papers to the view of others is forbidden and will result in a score of zero and disciplinary action.**

Question	Score	Max
1		15
2		6
3		6
4		6
5		9
6		6
Total		48

(1) [Marks: 15] Find the indicated derivatives. Do not simplify your answer.

(a) y' ; $\quad y = \dfrac{2e^{-3x}}{3 - x^3}$

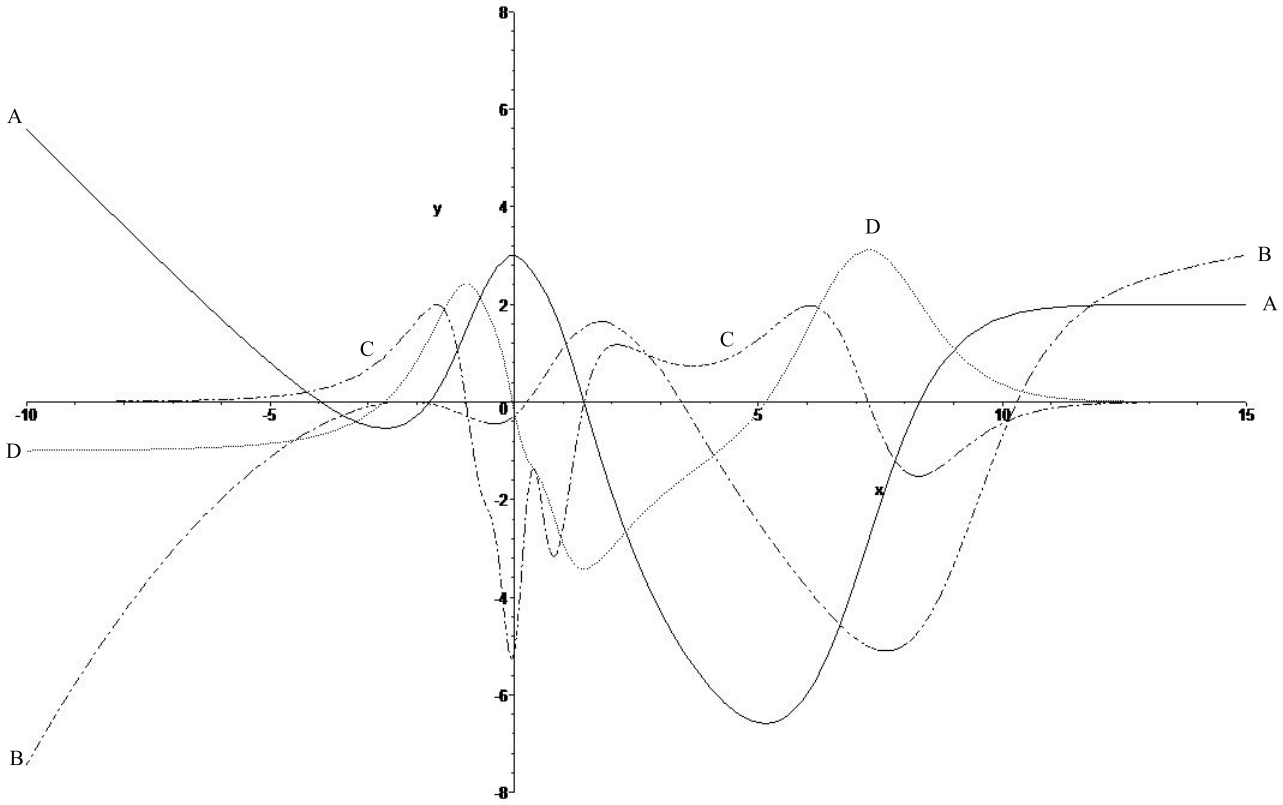
(b) y' ; $\quad y = -2x \tan^{-1}(4x + 1)$

(c) z' ; $\quad z = \ln\big(\log_3(\sec t)\big)$

(d) y' ; $\quad y^2 = 2(5^{xy})$

(e) y'' ; $\quad xy^3 = 2y^x$

(2) [Marks: 6] The following plot contains the graphs of $f(x), f'(x)$, and $f''(x)$ plus another function $g(x)$.



Match the graphs with the functions: For each, choose A, B, C, or D

graph of $f(x)$:
graph of $f'(x)$:
graph of $f''(x)$:

Provide **three** reasons for your choices from the plots above (indicate on the plots).

(3) [Marks: 6] A bottle of water at room temperature (20^oC) is placed into a fridge to cool. When the temperature of the fridge was 12^oC it took 50 minutes for the water to cool down to 15^oC.

What temperature must this fridge be for this same bottle of water (initially at 20^oC) to reach 12^oC in *30 minutes* after being placed in the fridge?

(4) [Marks: 6] Find all values of c for which the parabola $y = x^2 + c$ intersects the circle $x^2 + y^2 = 9$ orthogonally.

(5) [Marks: 9] An object is moving along a straight line with position $s(t) = t^3 - 12t + 3$.

(a) Find the velocity $v(t)$ and acceleration $a(t)$ of the object.

(b) When is the object moving to the right and moving to the left?

(c) What is the total distance travelled by the object in the time interval $0 \leq t \leq 3$?

(d) During what intervals (if any) is the particle speeding up and slowing down? Consider all possible times $t \in (-\infty, \infty)$.

(6) [Marks: 6] A particle is moving along the parabola $x^2 - 4x + 8$. Its x-coordinate as a function of time is $x(t) = 2t^3 + 5$ metres (t in seconds). Let l be the line joining the origin $(0, 0)$ to the particle. Determine how quickly the angle between the x-axis and the line l is changing when $x = 3$.