Simon Fraser University
Math 151-3, Spring 2004
Test 2 (Grey version)

Time: 50 minutes **10 March 2004**

Last Name Given Names

Student Number

Instructions

- Do not open this test booklet until instructed to do so.
- Print your name and write your student number above.
- The possession of any calculators in this test is considered as academic dishonesty.
- Full marks will be awarded for correct, complete and well-organized solutions.
- You may use the back of any page for rough work.
- There are 6 pages in this test booklet.

Question	Marks
1	/8
2	/8
3	/8
4	/6
5	/10
Total	/40

1. Find the following limits if they exist. Show and justify your work.

   (a) [4 marks] $\displaystyle \lim_{x \to 4^+} \frac{x-4}{\sqrt{x}-2}$

   (b) [4 marks] $\displaystyle \lim_{x \to \infty} \frac{\ln(5+x)}{x+\ln x}$

2. (a) [4 marks] Find $f'(t)$ if $f(t) = \dfrac{t^2 - 2t + 7}{e^{3t}}$. Do not simplify your answer.

(b) [4 marks] Differentiate $g(x) = x^x \sqrt{2 + \sin x}$. Express your answer as a function of x.

3. (a) [4 marks] Let $f(x) = 2x^3 + 5x^2 - 12x - 11$. The equation

$$f(x) = 0$$

has a solution near $x_1 = 2$. Use Newton's Method to find a better approximation x_2 of the solution to this equation. Express your answer as a fraction.

(b) [4 marks] Find $\dfrac{dy}{dx}$ if $x^3 = 5x^2y + 2y^3$.

4. Let P be a point on the curve of the function $y = \sqrt{5x}$, and let s be the distance between P and the origin $(0, 0)$.

   (a) [2 marks] Express s as a function of the x-coordinate x of P.

   (b) [4 marks] Suppose the x-coordinate of P increases at a constant rate of $\sqrt{14}$ units per second. How fast is s changing when the x-coordinate of P is 2 units?

5. For this question, let $f(x) = x^{1/3}(x-3)$.

(a) [4 marks] Find all critical points of f.

(b) [4 marks] Determine the open intervals on which f is increasing as well as those on which f is decreasing.

(c) [2 marks] Based on your results in Parts (a) and (b), classify each of the critical points of f as local maximum or minimum, absolute maximum or minimum, or not an extremum. (For example, "$f(x)$ has an absolute maximum at $x = 16$").