

Simon Fraser University

Math 151-3, Summer 04 Midterm 2

Date: 7 July, 2004
Time: 8:30 am - 9:20 am
Place: C9002

Last Name_____ Given Names_____

Student Number_____

Instructions

1. Do not open this test booklet until instructed to do so.
2. Print your name and write your student number above.
3. No calculators or other calculating devices may be used.
4. Full marks will be awarded for correct, complete and well-organized solutions.
5. You may use the back of any page for rough work.
6. There are 5 pages in this test booklet.

Question	1	2	3	4	5	6	Total
Marks	/12	/6	/6	/6	/5	/10	/45

Good Luck!

1 a) Use L'Hôpital's Rule to find the limit $\lim_{x \rightarrow 0} \frac{x - \sin x}{x^3}$. (6 marks)

b) Given $y = (\sec x)^x$, find $\frac{dy}{dx}$ by the logarithmic differentiation. (6 marks)

2 Use a linear approximation to estimate $\sqrt[3]{26}$. (6 marks)

3 Prove that $\ln(1+x) < x$, for $x > 0$. (6 marks)

4 Suppose that $y = f(x)$ is an implicit function defined by $ae^{-x} + be^{2y} = e^{x-y}$ and $f(0) = 0$ is a local extremum. Determine the numbers a and b . (6 marks)

5 Find a rational function $y = f(x)$ such that f has a vertical asymptote $x = 1$ and a horizontal asymptote $y = 2$. (5 marks)

6 Sketch the graph of $f(x) = e^{-x^2}$. (10 marks)

(Locate the y – intercept; Determine the intervals on which f is increasing or decreasing; Locate any local extremes; Determine the intervals on which f is concave upward or downward; Locate any inflection points; Locate any asymptotes and sketch the graph.)