Simon Fraser University
Department of Mathematics

Math 151 – Calculus I

Instructor: Bruce Kadonoff

Midterm #1 – Version A

1 June 2005

Name: ____________________________________

Student Number: ____________________________

Question	1	2	3	4	5	Total
Marks	/16	/4	/8	/6	/6	/40

Instructions:

1. Do not open this test booklet until instructed to do so.
2. You have 50 minutes for this exam.
3. There is a total of five (5) questions and 40 marks. Ensure you allot your time effectively.
4. You are allowed to use a basic scientific calculator (that is, no graphing or programming functions).
5. Answers may be written in pen or pencil. Errors or changed answers must be clearly erased or crossed out. Only work shown on this test paper will be marked.
6. You are not allowed any reference material including dictionaries. If you are caught with reference material, you will receive a zero on the exam and may face additional disciplinary action by the school administration.
7. Copying from or communicating with a neighbour will result in both students receiving a zero and may result in further disciplinary action by the school administration.
8. If you finish early, hand in your test and leave the room immediately.
9. Cellphones OFF, please.

1. [4 marks each] Find the limits:

a) $\displaystyle \lim_{x\to 0} \frac{\sin^2 x}{3x^2}$

b) $\displaystyle \lim_{x\to 4} \frac{|4-x|}{|x-4|}$

c) $\displaystyle \lim_{x\to 2^+} \frac{5x}{4-x^2}$

d) $\displaystyle \lim_{h\to 0} \frac{f(x+h)-f(x)}{h}$ if $f(x) = \dfrac{1}{\sqrt{2-x}}$.

2. [4 marks] Show that $f(x) = \dfrac{3-\sqrt{x}}{9-x}$ has a removable discontinuity $x = 3$. Find a function *g(x)* that agrees with *f(x)* for $x \neq 3$ but which is continuous.

3. [4 marks each] Find the equations of the lines tangent to:

a) $f(x) = x\sqrt{4-x^2}$ at the point (2 , 0)

b) $y = \dfrac{e^{2x}\cos x}{\ln(x+2)}$ at the point $\left(0, \frac{1}{\ln 2}\right)$.

4. [6 marks] A spherical hailstone is losing mass by melting uniformly over its surface as it falls. At a certain time, its radius is 2 cm and its volume is decreasing at a rate of 0.1 cm^3/s. How fast is its radius decreasing at that time? [Volume of a sphere: $V = \frac{4}{3}\pi r^3$]

5. [6 marks] A closed rectangular container with a square base is to have a volume of 2250 cm^3. The material for the top and bottom of the container will cost $2.00 per square cm and the material for the sides will cost $3.00 per square cm. Find the dimensions of the container with the least cost.