

Simon Fraser University
Department of Mathematics
Burnaby Campus

MATH 157-3, Summer 2008
Midterm 1
June 2nd, 2008, 11:30 – 12:20

Last Name (please print): _____

First Name (please print): _____

Student Number: _____

Instructor: P. Menz

Instructions:

9. Try your Best!

1. DO NOT OPEN THIS BOOKLET UNTIL TOLD TO DO SO.
2. Fill in the above box.
3. This exam contains 7 pages with a total of 6 questions. Once the exam begins please check to make sure your exam is complete.
4. SHOW ALL YOUR WORK!
5. If you run out of space in a problem, use the space on the back of the previous page and clearly indicate where the solution continues.
6. **Only** scientific, non-programmable calculators with no differentiation and integration capabilities are allowed.
7. No book, paper, or device, other than the usual writing instruments, this booklet and an acceptable calculator, shall be within reach of a student during the examination.
8. During the examination, speaking to, communicating with, or deliberately exposing written papers to the view of other examinees is forbidden.

Do not write in this table!	
Question	Marks
1	/4
2	/4
3	/6
4	/6
5	/6
6	/4
Total	/30

1. Short answer section: [1 mark each = 4 marks]



a) $|x| = (\sqrt{x})^2$. Is this a true statement? Explain or provide a counterexample.

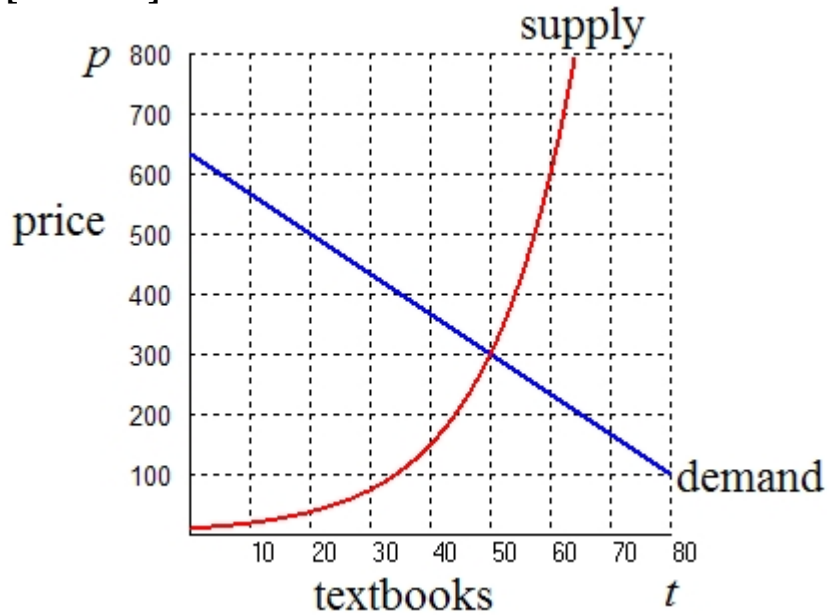
b) $\lim_{x \rightarrow \infty} \frac{6x^m - 5x}{2x^n + 1} = \frac{6}{2} = 3$ for two positive integers m and n with $m > n$. Is this a true statement? Explain or provide a counterexample.

c) Name two types of discontinuities for a function f at $x = a$ and provide a sketch for each.

d) Name one condition under which a function f is not differentiable at $x = a$ and provide a sketch.

2. The graphs of the supply and demand equations for calculus textbooks is given below, where the price p is in dollars and t is the number of textbooks.

[4 marks]



a) What is the demand equation?

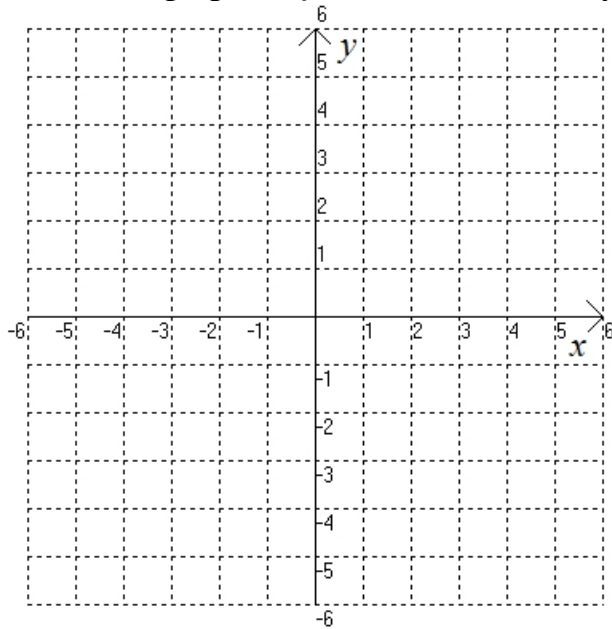
b) What are the equilibrium price and quantity?



3. Let $f(x) = \begin{cases} \frac{4}{x+2}, & x < 0 \\ \sqrt{x} + 2, & 0 \leq x \leq 4 \\ \frac{1}{4}x, & x > 4 \end{cases}$ [6 marks]



a) Sketch the graph of f in the coordinate system below.



b) What is the range of f ?

c) Is f continuous at $x = 4$? Why or why not?

4. Find the indicated derivative provided it exists. Do not simplify.
[6 marks]



a) $y = (x^4 + x^3 + x^2 + x + 1)(1 - x), y'$

b) $y = \frac{x}{x-7}, \frac{dy}{dx}$

c) $h(x) = \sqrt[3]{x^4 - 3x}, h'(x)$

5. Describe the following limits in terms of a real number, $\pm\infty$, or **DNE** (for does not exist). Show your work. **[6 marks]**

a) $\lim_{x \rightarrow 2} \frac{3}{x^2 - 4}$



b) $\lim_{x \rightarrow -5^-} \frac{|x + 5|}{x + 5}$

c) $\lim_{x \rightarrow 3} \frac{9 - x^2}{x - 3}$

6. The profit in dollars from selling x pounds of cocoa beans is given by $P(x) = 30\sqrt{x} + 1$. **[4 marks]**
- a) Find the average rate of change in profit from selling 4 lb to 9 lb of cocoa beans.
- b) Find the marginal profit. You must differentiate by using the definition of the derivative.

