

Version A

A

SIMON FRASER UNIVERSITY

MATH 157 Quiz 1
Section D100

October 1, 2007

Time: 11:35 – 12:10

Last Name SOLUTION

Given Name(s) _____

Student # _____

SFU email ID _____

Student signature

INSTRUCTIONS

1. **Do not open this booklet until told to do so.**
2. This exam has 4 questions on 4 pages excluding this cover page. Please check to make sure your exam is complete.
3. **Calculators are not allowed. No electronic devices may be within reach of a student.**
4. Write your full name, student number and SFU email ID on the cover page.
5. Please read the questions carefully, and make sure you understand what you are asked to do!
6. Please write with a black or blue **pen**.
7. Use the reverse side of the **previous page** if you need more room for your rough work.
8. **You may lose marks if your explanations are incomplete, missing, or poorly presented.**
9. You may attempt the questions in any order.
10. **You must stop writing immediately when asked to do so!**

Question	Score
1	/20
2	/10
3	/10
4	/10
Total	/50



1. The following questions are True/False questions. No explanation is required for your answer. You do have four choices for your answers:

1. True, I am sure. 2. False, I am sure.
3. True, I am guessing. 4. False, I am guessing.

If you select "I am sure" you get 4 points for a correct, 0 points for an incorrect answer.
If you select "I am guessing", you earn 3 points for the correct answer, and 1 point for an incorrect one.

- [4] (a) The graph of the exponential function $y = a^x$ rises as we move to the right, i.e., a^x is an increasing function for $a > 0$.

decreases for $0 < a < 1$

- [4] (b) For $x > 0$ we have $\ln(x^4) - \ln(x^3) = \ln(x)$.

$$\ln(x^4) - \ln(x^3) = \ln \frac{x^4}{x^3} = \ln x \quad \checkmark$$

- [4] (c) Two logarithms with different bases a and b ($a > 0$ and $b > 0$) are related via

$$\log_b(x) = \frac{\log_a(x)}{\log_a(b)}$$

(= $\frac{\log_a(x)}{\log_a(b)}$, if $a \neq 1$, $b \neq 1$)

- [4] (d) Let $f(x) = \frac{x^2 - 1}{x - 1}$, and $g(x) = x + 1$. Then the two functions f and g are the same, i.e., $f(x) = g(x)$ for all x .

not the same domain

- [4] (e) The intersection of the supply and demand curves is called the break-even point

Question	I am sure TRUE	I am sure FALSE	I am guessing TRUE	I am guessing FALSE
(a)		<i>F</i>		
(b)	<i>T</i>			
(c)		<i>F</i>		
(d)		<i>F</i>		
(e)		<i>F</i>		

2. "Interest"ing Logarithms

- [5] (a) An initial deposit of \$1,000 earns interest at a nominal annual rate of 12%, compounded monthly. Write down an expression (do not evaluate!) for the amount of money in this account after 2 years.

$$A = 1000(1.01)^{24} \quad \leftarrow 2 \times 12 \text{ Dollars}$$

$\uparrow 1 + \frac{0.12}{12}$

- [5] (b) Assume you start with \$2,000 in an account earning interest at a nominal annual rate of 12%, compounded monthly. How many months will it take until the amount in the account exceeds \$5,000? Your answer should be an expression involving logarithms – you do not need to evaluate this expression.

$$n = \ln(2.5) / \ln(1.01) \quad \underline{\underline{\text{months}^*}}$$

SHOW YOUR WORK

$$5000 = 2000(1.01)^n$$

$$2.5 = (1.01)^n$$

$$\ln(2.5) = n \ln(1.01)$$



3. Limits

[5] (a) Find the following limit:

$$\lim_{x \rightarrow 1} \frac{x^2 - 1}{x^2 + x - 2} = \frac{2}{3}$$

[5] (b) Find the following limit:

$$\lim_{x \rightarrow \infty} \frac{x^2 - 1}{x^2 + x - 2} = 1$$

SHOW YOUR WORK

$$(a) \lim_{x \rightarrow 1} \frac{\cancel{(x-1)}(x+1)}{\cancel{(x-1)}(x+2)} = \frac{2}{3}$$

$$(b) \lim_{x \rightarrow \infty} \frac{1 - 1/x^2}{1 + 1/x - 2/x^2} = 1$$

4. **Cost and revenue.** A local Lower Mainland bicycle company manufactures a high-performance mountain bike, the "Exhilarator". The cost of manufacturing 500 bicycles is \$500,000, whereas it costs \$900,000 to produce 1000 bicycles. Assume the cost function is linear. Wholesale price of the Exhilarator is \$1200. We choose the following units for our equations: Cost and revenue in Dollars, quantity of bicycles in units of 1.

- [2] (a) What is the fixed cost of the production of the "Exhilarator"?

$$\$ 100,000$$

$$\text{SLOPE} = \frac{900000 - 500000}{1000 - 500} = 800$$

$$\Rightarrow \text{Y-INTERCEPT} = 100,000$$

- [2] (b) What is the marginal production cost?

$$\$ 800$$

- [2] (c) What is the cost function?

$$C(x) = 100000 + 800x$$

- [4] (d) What production quantity is the break-even point?

$$R(x) = 1200x, \quad R(x) = C(x)$$

$$1200x = 100000 + 800x, \quad 400x = 100000$$

SHOW YOUR WORK

$$x = 250 \text{ bicycles}$$

BREAK EVEN
LEVEL