



Okanagan College  
Math 112 (071) Fall 2009  
Term Test Two – Marksheet  
Instructor: Clint Lee  
Wednesday, October 29

Student Name: \_\_\_\_\_

Total Marks: \_\_\_\_\_

40

Problem	Marks	
1 Total		/2
2 Total		/2
3 Total		/2
4 Total		/2
5 Total		/2
6 Total		/3
7 (a)	/3	
7 (b)	/3	
7 (b)	/3	
7 Total		/9
8 (a)	/3	
8 (b)	/5	
8 Total		/8
9 (a)	/2	
9 (b)	/4	
9 Total		/6
10 Total		/4
Exam Total		/40





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**Instructions.** Do all parts of all 10 questions. Show all work and give explanations where required. You may receive part marks for a question if your work is correct even if the final answer is incorrect. However, if your answer is incorrect and no work or explanation is given, you will receive no marks. The number of points for each question is given in the left margin, total 40.

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In problems 1 through 5 give a brief answer. You will be marked only on your answer, not on your work.

[2] 1. Evaluate the limit or explain why it does not exist:  $\lim_{x \rightarrow 0} \frac{x^2 - x - 12}{x^2 - 7x + 12}$

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[2] 2. Evaluate the limit or explain why it does not exist:  $\lim_{x \rightarrow \infty} \frac{3x^2 + 4}{x^2 - 1}$

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[2] 3. Find  $f'(t)$  for  $f(t) = t^2 + 2e^t$ . Do not simplify.

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[2] 4. Find  $k'(x)$  for  $k(x) = \frac{x}{x+1}$ . Do not simplify.

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[2] 5. Let  $y = f(x)$  where  $\left. \frac{dy}{dx} \right|_2 = 3$  and  $f(2) = 4$ . Find an equation of the tangent line to the curve  $y = f(x)$  at the point on the curve where  $x = 2$ .

- [3] 6. A version of the Intermediate Value Theorem is given below with some parts left blank. Fill in each blank with the correct quantity or statement from the selections (A) – (I) given below.

Let  $f$  be a function that is \_\_\_\_\_ on the interval  $[a, b]$ . Suppose that  $f(a) > 0$  and  $f(b)$  \_\_\_\_\_. There is a number  $c$  in the interval  $(a, b)$  for which \_\_\_\_\_.

- |                    |                 |                                       |
|--------------------|-----------------|---------------------------------------|
| (A) differentiable | (B) continuous  | (C) defined                           |
| (D) $f(c) = 0$     | (E) $f'(c) = 0$ | (F) $f\left(\frac{a+b}{2}\right) = c$ |
| (G) $< 0$          | (H) $> 0$       | (I) $= 0$                             |

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7. Evaluate each limit, if it exists. If the limit is infinite, give its value as either  $\infty$  or  $-\infty$ . If the limit does not exist, explain why.

[3] (a)  $\lim_{x \rightarrow 4} \frac{x^2 - x - 12}{x^2 - 7x + 12}$

[3] (b)  $\lim_{x \rightarrow 2} \frac{x^2 + x - 6}{\sqrt{x+2} - 2}$

[3] (c)  $\lim_{x \rightarrow 3^-} \frac{1-x}{\sqrt{10-x^2} - 1}$

8. Find the indicated derivative, or derivatives. Simplify only if instructed to do so.

[3] (a) Find  $\left. \frac{ds}{dt} \right|_{t=64}$  for  $s = \frac{\sqrt{t}}{2} + \frac{3}{\sqrt[3]{t}}$ .

[5] (b) Find  $q'(x)$  and  $q''(x)$  for  $q(x) = (x^2 + 2x)e^{-2x}$ . Simplify both derivatives.

- [2] 9. (a) State the limit definition of the derivative of the function  $f$ .
- [4] (b) For the function in Problem 4,  $k(x) = \frac{x}{x+1}$ , use the limit definition of the derivative to find  $k'(x)$ . Completely simplify your answer and make sure that it agrees with your answer in Problem 4.

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- [4] 10. Studies show that the amount of garbage produced per household in small rural communities decreases as the population increases. The results of one study produced the results shown in the graph at the right. If  $G(P)$  is the number of kilograms of garbage produced per person in one month when the population is  $P$  thousand people, draw an appropriate tangent line on the graph shown to estimate the value of  $G'(40)$ . Explain in practical terms what the value of this derivative represents and give its units.

