CAMOSUN

Name: _____

Mark: ____/25

MATH 100 (Fall, 2026)

Test 1B

1. Consider the following equation relating x and y.

$$x(x+y^2) = 1 - y^2(1-x)$$

(a) (2 marks) Solve for y in terms of x.

(b) (1 mark) Does the equation define y as a function of x? Briefly explain.

2. (2 marks) Solve the equation for θ. Find **all** solutions.

$$1 - 2\sin\theta\cos\theta = 0$$

3. (3 marks) Evaluate the limit $\lim_{x\to 9} \dfrac{\sqrt{18-x}-\sqrt{x}}{9-x}$.

4. (3 marks) Let $f(x) = x^4 - 8x + 9$ on the interval $[1, 2]$ and let $k = 7$. Verify that the conditions of the Intermediate Value Theorem are satisfied, guaranteeing the existence of at least one number c in the given interval for which $f(c) = k$.

5. Let f and g be differentiable functions and define $h(x) = f(x)g(x)$.

   (a) (1 mark) Write the product rule formula for $h'(x)$ in terms of f, g and their derivatives.

   $h'(x) =$

   (b) (1 mark) Suppose the values of f and g and their derivatives are defined at various values of x as given in the following chart. Evaluate $h'(2)$.

x	$f(x)$	$g(x)$	$f'(x)$	$g'(x)$
1	3	2	4	3
2	3	1	2	5
3	1	3	3	2

6. (a) (1 mark) State the limit definition of a derivative of $f(x)$.

$f'(x) =$

(b) (3 marks) Use the **limit definition** of a derivative to find $f'(x)$, where $f(x) = \dfrac{x}{x+1}$.

7. (3 marks) Find the equation of the tangent line to the following curve at $x = 9$. Express your answer in slope-intercept form.

$$y = 2\sqrt{x} + \frac{9}{x}$$

8. Differentiate the following functions and simplify your answer.

(a) (1 mark) $y = x^5 + 3x^2 - 4x - 2$

(b) (2 marks) $f(\theta) = 4\sec^3(5\theta - 1)$

(c) (2 marks) $y = \dfrac{4x - 7}{3x + 2}$