CAMOSUN

Name: _____

Mark: ____
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MATH 100 (Fall, 2026)

Test 1A

1. Consider the following equation relating x and y.

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

(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.

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

3. (3 marks) Evaluate the limit $\lim_{x\to 4} \dfrac{\sqrt{8-x}-\sqrt{x}}{4-x}$.

4. (3 marks) Let $f(x) = x^3 - 4x + 5$ on the interval $[1, 2]$ and let $k = 3$. 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 $h(x) = f(g(x))$.

   (a) (1 mark) Write the chain 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 $x = 4$. Express your answer in slope-intercept form.

$$y = 6\sqrt{x} + \frac{16}{x}$$

8. Differentiate the following functions and simplify your answer.

(a) (1 mark) $y = x^4 - 7x^2 + 5x - 1$

(b) (2 marks) $f(\theta) = 3\sec^3(7\theta + 2)$

(c) (2 marks) $y = \dfrac{5x + 3}{2x - 7}$