Calculus 1

Test 1

Form A

Spring 2016

Name: _____

Date: _____

<u>READ THESE INSTRUCTIONS CAREFULLY!</u>

- Circle or underline your final written answer.

- Justify your reasoning and show your work.

- If you run out of space, make a note and continue your work on the back of a page.

1. (10 pts.) Compute the following limit.
$$\lim_{x \to 0} \frac{8x^2 + 3x + \sin x}{x}$$

2. (10 pts.) Compute the following limit.
$$\lim_{x \to 2} \frac{x^2 - 10x + 16}{x - 2}$$

3. (10 pts.) Compute the following limit.
$$\lim_{x \to 3} \frac{x^3 - 4x^2 + x + 6}{x - 3}$$

4. (10 pts.) Compute the following limit.
$$\lim_{x \to 7} \frac{\sqrt{x-6}-1}{x-7}$$

5. (10 pts.) Compute the limit of the difference quotient

$$\lim_{x \to t} \frac{f(x) - f(t)}{x - t}$$

when $f(x) = 12x + 9$ and $t = 6$.

6. (10 pts.) Compute the following derivative.

$$\frac{d}{dx} \left(12x^2 + 8x + 3 \right)$$

7. (10 pts.) Let $f(x)$ be the function
$$f(x) = \begin{cases} \frac{x-b}{b+3} & \text{if } x < 0 \\ x^2 + b & \text{if } x \geq 0. \end{cases}$$
Find the value(s) of the constant b such that $f(x)$ is continuous everywhere.

8. (10 pts.) Compute the derivative of the following function of t.
$$f(t) = \frac{9}{t^3} + \frac{6}{t} + 9t^4.$$

9. (10 pts.) Find the values of x at which the line tangent to
$$f(x) = x^3 + 19x^2 + 99x + 64$$
is horizontal.

10. (10 pts.) Let $f(x) = x + \frac{2}{x}$.

    (a) Compute the derivative of f.

    (b) Find an equation for the line tangent to f at the point $(1, 3)$.

Bonus. Compute the derivative of the following function.

$$f(x) = \frac{x^2 + 5x + 5}{4x - 3}$$