2.6 Constant, Const. Multiple, Sum/Diff Rules

CA #2

Calculus Name: _____

Find the derivative of each function.

1. $s(t) = -16t^2 + 40t + 5$

2. $f(x) = \frac{1}{\sqrt{x}} + \frac{3}{\sqrt[5]{x^2}}$

3. $y = \frac{3}{2}x^2 - \frac{1}{x^8} + 4x$

4. $f(x) = \frac{3}{x^7} + 2e^5$

5. $f(x) = 4x^{\frac{7}{2}} - \pi^4$

Find the x-value(s) where the function has a horizontal tangent.

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

7. $f(x) = \frac{x^4}{4} + 3x^3 + 10x^2 - 5$

Find the equations of the tangent AND normal lines of each function at the given value of x.

8. $y = x^2 + \frac{x}{2} - 3$ at $x = -2$

Tangent: _____

Normal: _____

9. $g(x) = 5 - \frac{4}{x}$ at $x = 4$

Tangent: _____

Normal: _____

Are the functions differentiable at the given value of x?

10. At $x = -2$.

$$f(x) = \begin{cases} 4x^2 + 16x, & x \le -2 \\ x^3 - 3x^2 + 4, & x > -2 \end{cases}$$

11. At $x = 3$.

$$f(x) = \begin{cases} 3x^2 - 2x + 6, & x < 3 \\ 7x - x^3, & x \ge 3 \end{cases}$$

What values of a and b would make the function differentiable at the given value of x?

12. At $x = 2$

$$f(x) = \begin{cases} ax + b, & x < 2 \\ x^2 - a, & x \ge 2 \end{cases}$$

13. At $x = -1$.

$$f(x) = \begin{cases} \frac{a}{x^2} + 3x + b, & x < -1 \\ bx - 4, & x \ge -1 \end{cases}$$

Answers to 2.6 CA #2

1. $s'(t) = -32t + 40$	2. $f'(x) = -\frac{1}{2\sqrt{x^3}} - \frac{6}{5\sqrt[5]{x^7}}$	3. $\frac{dy}{dx} = 3x + \frac{8}{x^9} + 4$	4. $f'(x) = -\frac{21}{x^8}$
5. $f'(x) = 14x^{\frac{5}{2}}$	6. $x = 0, -1, -\frac{1}{4}$	7. $x = 0, -5, -4$	8. T: $y = -\frac{7}{2}(x+2)$ N: $y = \frac{2}{7}(x+2)$
9. T: $y - 4 = \frac{1}{4}(x-4)$ N: $y - 4 = -4(x-4)$	10. No. Continuous, but not differentiable.	11. No, not continuous.	12. $a = 4,\ b = -8$	13. $a = -\frac{7}{5},\ b = \frac{1}{5}$