

**No Phones. No Calculators.
Use Fractions, not Decimals**

For each of the functions below,

- Use the short-cut rules for differentiation to identify the derivative function.
- Use the derivative to compute the slope of the tangent line at the given x -value.
- Identify the equation of tangent line at the given x -value.

(1) $f(x) = x^2 - 2$ at $x = 2$

Derivative Function:

Slope:

Tangent Line Equation:

(2) $f(x) = 3x^3$ at $x = -1$

Derivative Function:

Slope:

Tangent Line Equation:

(3) $4\sqrt{x}$ at $x = \frac{1}{4}$

Derivative Function:

Slope:

Tangent Line Equation:

(4) $\frac{3}{x^3}$ at $x = 2$

Derivative Function:

Slope:

Tangent Line Equation:

(5) $\frac{2x-1}{x^2}$ at $x = \frac{1}{2}$

Derivative Function:

Slope:

Tangent Line Equation:

(6) $\frac{x+1}{x}$ at $x = -2$

Derivative Function:

Slope:

Tangent Line Equation:

(7) $\frac{x^2-x}{x}$ at $x=2$

Derivative Function:

Slope:

Tangent Line Equation:

(8) $3x^3 + x^2 - x + 4$ at $x = -\frac{2}{3}$

Derivative Function:

Slope:

Tangent Line Equation:

(9) $8\sqrt[3]{x} + \frac{3}{x}$ at $x=8$

Derivative Function:

Slope:

Tangent Line Equation:

(10) $(4x^2 - \sqrt[3]{x})(3x^5 + \sqrt{x})$ at $x = 1$

Derivative Function:

Slope:

Tangent Line Equation:

(11) $\frac{4\sqrt{x}}{x}$ at $x = 16$

Derivative Function:

Slope:

Tangent Line Equation:

(12) $\frac{1 - \sqrt[3]{x}}{2x}$ at $x = 8$

Derivative Function:

Slope:

Tangent Line Equation:

(13) $(4x^2 - \sqrt[3]{x} + 5x - 7)(3x^5 + \sqrt{x} - 2)$ at $x = 1$

Derivative Function:

Slope:

Tangent Line Equation:

(14) $\frac{4\sqrt{x}}{x-12}$ at $x = 16$

Derivative Function:

Slope:

Tangent Line Equation:

(15) $\frac{1-\sqrt[3]{x}}{2x-10}$ at $x = 8$

Derivative Function:

Slope:

Tangent Line Equation: