

Use appropriate formulas to find derivatives unless the instructions specifically state that the definition involving limits must be used to determine the derivative. You may use only techniques taught in Math 31A to calculate limits. In particular, you may not use L'Hospital's Rule (calculation of derivatives of numerator and denominator) to find a limit.

1. Differentiate

$$(a) \quad f(x) = \frac{2x + 1}{1 + \sec x}$$

$$(b) \quad f(x) = \sqrt{x - 2\sqrt{x^2 - 1}}$$

2. Find all the values of x for which the tangent lines to the graph of

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

at $(x, f(x))$ pass through the point $(1, -3)$.

3. Evaluate the limits, if they exist.

$$(a) \quad \lim_{x \rightarrow 2} \frac{x^3 - 3x^2 + 2x}{x^2 - x - 2}$$

$$(b) \quad \lim_{x \rightarrow 0} x \cot x$$

4. Find the equation of the tangent line to the curve

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

at $(-1, 1)$.

5. Use the **definition** of the derivative to find the derivative of

$$f(x) = \sqrt{2x^2 + 1}$$