

No calculators or computers.

1. State the limit definition of the derivative.
2. Use the definition of the derivative to compute $f'(3)$ where $f(x) = x^2 - 5x + 3$.
3. Evaluate the following limits.

(a) $\lim_{x \rightarrow \infty} \frac{x^3 - 4x^2 + 3x - 2}{2 - x^2 - 3x^3}$

(b) $\lim_{x \rightarrow 3^+} \frac{x + 1}{x^2 - 2x - 3}$

4. Find an equation for the line tangent to the graph of $f(x) = e^{-x}$ at the point where $x = \ln 2$.
5. Compute derivatives of the following.

(a) $f(x) = \sqrt[3]{x^2} + x^4 \tan x$

(b) $g(t) = \frac{t^2 - 3t}{2t^2 + 4} + \ln 3$

(c) $h(y) = \cos^2 y + \arctan 2y$

6. Given $e^{xy} = \frac{1}{x} + y^2$, compute dy/dx .

7. Find antiderivatives for the following.

(a) $f(x) = \frac{1}{x^4} + e^{2x} + \frac{1}{2}$

(b) $g(x) = \frac{1}{3x} + \frac{2}{1+x^2} + \cos 2$