

SL Test Review: Differential Calculus

Evaluate each derivative.

[1]  $f(x) = 3x + 2$

[2]  $f(x) = 4x^2 - 5x + 3$

[3]  $f(x) = (3x - 2)^4$

[4]  $f(x) = e^{5x+6}$

[5]  $f(x) = \frac{2x+4}{3x+1}$

[6]  $f(x) = x^3 \cdot e^{5x}$

[7]  $f(x) = \frac{1}{x^3}$

[8]  $f(x) = \sqrt{4x+3}$

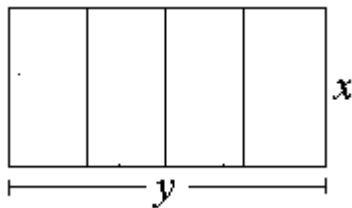
[9]  $f(x) = \frac{e^x}{x^3}$

[10-12] For each function, find the intervals on which  $f$  is increasing, the intervals on which  $f$  is concave up, and identify all extrema and points of inflection.

[10]  $f(x) = x^3 - 3x^2 + 2$

[11]  $f(x) = xe^x$

[12]  $f(x) = \frac{1}{x^2 + 1}$



[13] A rancher wants to enclose a rectangular corral divided into 4 sections as shown. If she has 4000 feet of fence material, find the dimensions of the largest possible such corral.

[14] A neighboring rancher want to build a similar corral that encloses 10000 square feet of area. Find the dimensions of the corral that requires the least amount of fence.

[15] Write an equation for the line tangent to the graph of  $f(x) = \sqrt{x}$  at  $x = 9$ .

[16] Write an equation for the line tangent to the graph of  $f(x) = x^3 - x$  at  $x = 1$ .