

GRADE 12 CALCULUS
DERIVATIVES ASSIGNMENT

1. Use the difference quotient and a limit to find the instantaneous rate of change of the following function at any value of x .

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

2. How would you explain to someone (who had attained only grade 10 math) the meaning of a derivative? Use sketches in your explanation.
3. Sketch the function $f(x) = x(x^2 - 9)$ and its derivative on the same axes. Don't worry about the y scale.

4. Determine the derivatives of the following and simplify where possible.

a) $f(x) = 3x^{5/3} + 7x^{1/3}$

b) $f(x) = \frac{2}{3}x^{2/5} - \frac{5}{2}x^{0.4}$

c) $f(x) = -3\cos x$

5. The following represent derivative functions. Determine $f(x)$ in each case.

a) $f'(x) = -28x^3 + 6x^2 - 11$

b) $f'(x) = 5x^2 + \frac{3}{4}x^{-1/4} + \frac{8}{5}x^{-3/5}$

6. Evaluate the following derivatives

a) $f(x) = (\sin x)(x^3 + 2x)(\tan x)$

b) $f(x) = \frac{(7x^2 - 3(\sqrt[5]{x^2}))}{(-\sin x)}$

7. Find the values of x at which $y = \frac{x^2 + 2x + 8}{x - 2}$ has a horizontal tangent.

8. Question 14, page 123.