

Grade 12

Calculus 24 June 2020

Derivative

First Principles and Rules Worksheet

Answer all the questions.

Question 1

Consider the function $f(x) = 2x^2 - x$

1.1 Determine $f(x+h)$

1.2 Determine $f'(x)$ by using first principles.

Question 2

If $f(x) = 5x^2 - 4x + 2$, determine $f'(x)$ from first principles.

Question 3

If $f(x) = \frac{2}{x}$ determine $f'(x)$ from first principles.

(HINT $f(x+h) = \frac{2}{x+h}$)

Rules

1. If $f(x) = b$ then $f'(x) = 0$
where b is a constant

2. If $f(x) = x^n$ then $f'(x) = nx^{n-1}$

3. $\frac{d}{dx}[f(x) \pm g(x)] = \frac{d}{dx}[f(x)] \pm \frac{d}{dx}[g(x)]$

4. $\frac{d}{dx}[kf(x)] = k\frac{d}{dx}[f(x)]$

Using the RULES OF DIFFERENTIATION

Question 4

If $f(x) = x^3$, determine $f'(x)$

Question 5

Determine $f'(x)$ of the following:

5.1 $f(x) = 4$

5.2 $f(x) = x^5$

5.3 $f(x) = 3x^4$

5.4 $f(x) = 3x^{-2}$

5.5 $f(x) = 5x^{-3} + 4x^2$

5.6 $f(x) = \sqrt[3]{x}$ (HINT If $\sqrt[3]{x} = x^{\frac{3}{2}}$)