EXERCISES – The First & Second Derivative

(A) The sign of the 1st derivative

(1) Is the curve $y = 2x^3 - 4x + 5$ increasing or decreasing at the following points?

(a) (1 , 3) (b) (0 , 5) (c) (-2 , -3)

(2) At what point(s) on the curve $y = x^3 - 3x^2 - 9x + 5$ is the gradient zero?

(3)* Show that (2 , 4) is a *turning point* of the curve $y = 4x - x^2$.
(show that $y' = 0$ at this point and that the gradient before and after this point are different signs)

(B) Find the 2nd derivative $f''(x)$ of the following functions:

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

(3) $f(x) = x - 4\sqrt{x}$ (4) $f(x) = (2x^2 - 3)^5$

Answers:

(B) 1. a) increasing, b) decreasing, c) increasing. 2. (3,-22) and (-1,10)
3. solve $y' = 0$ and show that y' changes from positive to negative.

(C) 1. $f''(x) = \frac{1}{x^3}$ 2. $f''(x) = 6x - 10$ 3. $f''(x) = \frac{1}{\sqrt{x^3}}$ 4. $f''(x) = 20(2x^2 - 3)^3(18x^2 - 3)$