Homework 1
8/28

3.2(ii) Rewrite the following answer to the exercise 'Find the local maximum and minimum values of the function $f : \mathbb{R} \to \mathbb{R}$, $f(x) = 2x^3 - 12x^2 + 18x$, and sketch its graph.'
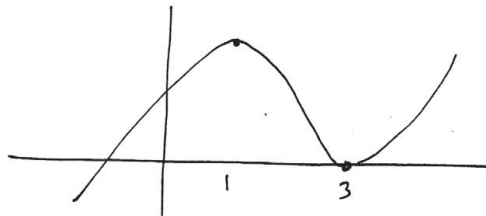
$$f = 2x^3 - 12x^2 + 18x$$
$$= 6x^2 - 24x + 18 \implies \quad x = \frac{24 \pm \sqrt{24^2 - 4 \times 18 \times 6}}{2 \times 6}$$
$$\frac{24 \pm \sqrt{144}}{12}$$
$$2 \pm 1$$
$$1, 3.$$

$$\frac{d^2 y}{dx^2} = 12x - 24 \implies \frac{d^2 y}{dx^2} = 12 \times 1 - 24 = -12 < 0 \quad \text{max}$$

$$\frac{d^2 y}{dx^2} = 12 \times 3 - 24 = 12 > 0 \quad \text{min}$$

$$y = 2 - 12 + 18 = 8$$
$$y = 2 \times 27 - 12 \times 9 + 18 \times 3$$
$$= 0.$$