

Problem: 0580/42/O/N/21/ Q10

- (a) Find the coordinates of the turning points of the graph of $y = x^3 - 12x + 6$.
You must show all your working.

$$\frac{dy}{dx} = 3x^2 - 12$$

$$0 = 3x^2 - 12 \quad 3x^2 = 12$$

$$x^2 = 4$$

$$x = -2, 2$$

$$x = -2 \quad y = (-2)^3 - 12(-2) + 6 = 22 \quad (-2, 22)$$

$$x = 2 \quad y = (2)^3 - 12(2) + 6 = -10 \quad (2, -10)$$

- (b) Determine whether each turning point is a maximum or a minimum.
Show how you decide.

$$\frac{d^2y}{dx^2} = 6x$$

$$x = -2 \quad \frac{d^2y}{dx^2} = -12 < 0$$

hence $(-2, 22)$ will be maximum

$$x = 2 \quad \frac{d^2y}{dx^2} = 12 > 0$$

hence $(2, -10)$ will be minimum