2.

$$x\frac{dy}{dx} - y^3 = 4$$

(a) Show that

$$x\frac{d^3y}{dx^3} = ay\left(\frac{dy}{dx}\right)^2 + \left(by^2 + c\right)\frac{d^2y}{dx^2}$$

where a, b and c are integers to be determined.

(4)

Given that $y = 1$ at $x = 2$

(b) determine the Taylor series expansion for y in ascending powers of $(x - 2)$, up to and including the term in $(x - 2)^3$, giving each coefficient in simplest form.

(3)

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Question 2 continued

(Total for Question 2 is 7 marks)