Question Number	Scheme	Notes	Marks
4(a)	$\frac{dy}{dx} = y^2 - x \Rightarrow \frac{d^2y}{dx^2} = 2y\frac{dy}{dx} - 1$	Correct expression for $\frac{d^2y}{dx^2}$	B1
	$\frac{d^3y}{dx^3} = 2y\frac{d^2y}{dx^2} + 2\left(\frac{dy}{dx}\right)^2$ **M1**: Applies the product rule to obtain $\frac{d^3y}{dx^3} = Ay\frac{d^2y}{dx^2} + ...$ or $\frac{d^3y}{dx^3} = ... + B\left(\frac{dy}{dx}\right)^2$ where … is non-zero **A1**: Correct expression. Apply isw if necessary.		M1 A1
	$\frac{d^3y}{dx^3} = 2y\frac{d^2y}{dx^2} + 2\left(\frac{dy}{dx}\right)^2 \Rightarrow \frac{d^4y}{dx^4} = 2y\frac{d^3y}{dx^3} + 2\frac{dy}{dx}\frac{d^2y}{dx^2} + 4\frac{dy}{dx}\frac{d^2y}{dx^2}$ $\frac{d^4y}{dx^4} = 2y\frac{d^3y}{dx^3} + 6\frac{dy}{dx}\frac{d^2y}{dx^2}$ Correct expression for $\frac{d^4y}{dx^4}$ or correct values for A and B.		A1
	Note: If e.g. $\frac{d^2y}{dx^2} = 2y\frac{dy}{dx}$ is obtained, allow recovery in (a) so B0M1A1A1 is possible.		
			(4)
(b)	$(y)_{-1} = 1, (y')_{-1} = 2, (y'')_{-1} = 3, (y''')_{-1} = 14, (y'''')_{-1} = 64$ Attempts the values up to at least the 3rd derivative using $x = -1$ and $y = 1$ Condone slips provided the intention is clear. May be implied by their values.		M1
	$(y =) 1 + 2(x+1) + \frac{3(x+1)^2}{2} + \frac{14(x+1)^3}{3!} + \frac{64(x+1)^4}{4!} + ...$ Correct application of the Taylor series in powers of $(x + 1)$ If the expansion is just written down with no formula quoted then it must be correct for their values. E.g. $y = -1 + …$ with no evidence $y = f(-1)$ was meant scores M0		M1
	$(y =) 1 + 2(x+1) + \frac{3(x+1)^2}{2} + \frac{7(x+1)^3}{3} + \frac{8(x+1)^4}{3} + ...$ Correct simplified expansion. The "$y =$" is not required.		A1
			(3)
			Total 7

Question 5
General Guidance

B1: This mark is for sight of -8 seen as part of their working. It may be seen as e.g. embedded in an inequality, as part of their solution if they consider for example $x > -8$, $x < -8$ or -8 is seen in a sketch etc.
Do not allow for just e.g. $x + 8 > 0$,

M1: Any valid attempt to find at least one critical value other than $x = -8$ (see below).
Condone use of e.g. "=", ">", "<" etc as part of their working.
Note these usually come in pairs as $3, -\frac{19}{3}$ or $3, -13$

M1: A valid attempt to find all critical values.
Condone use of e.g. "=", ">", "<" etc as part of their working.

A1: Any 2 critical values other than $x = -8$. May be seen embedded in an inequality or on a sketch.

A1: 2 correct regions

A1: All correct with no extra regions