

5.

$$y = \arctan(\sinh(x))$$

(a) Show that $\frac{d^3 y}{dx^3} = \frac{dy}{dx} - 2\left(\frac{dy}{dx}\right)^3$ (7)

(b) Hence find $\frac{d^5 y}{dx^5}$ in terms of $\frac{dy}{dx}$, $\frac{d^2 y}{dx^2}$ and $\frac{d^3 y}{dx^3}$ (4)

(c) Find the Maclaurin series for y , in ascending powers of x , up to and including the term in x^5 (3)