4.

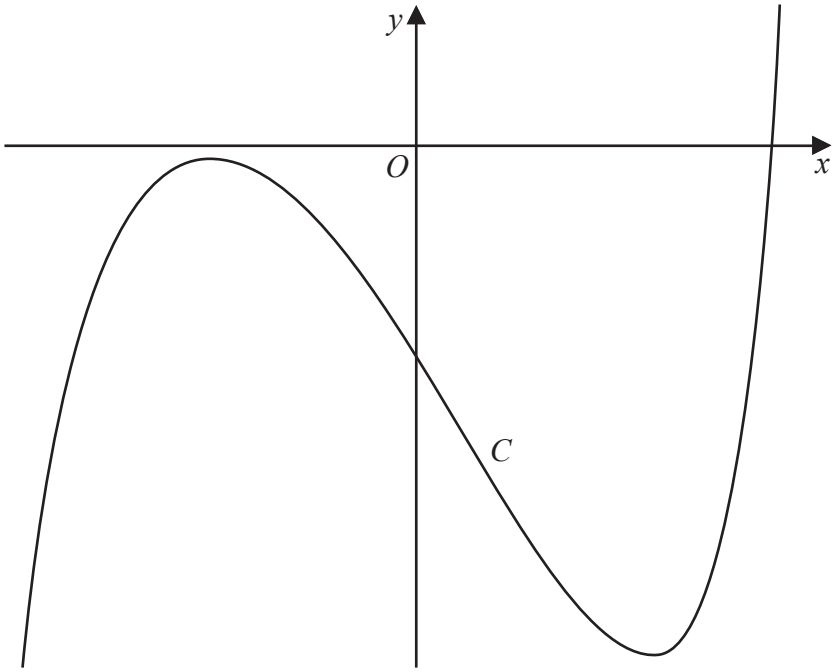


Figure 1

In this question you must show all stages of your working.
Solutions relying entirely on calculator technology are not acceptable.

(a) Show that

$$\text{arsinh}x = \ln\left(x + \sqrt{x^2 + 1}\right)$$

(3)

The curve C has equation

$$y = \left(\sinh x - 3\right)\cosh x - 6x$$

A sketch of C is shown in Figure 1.

(b) Determine the exact range of values of x for which C is decreasing, giving the answer in terms of simplified natural logarithms.

(6)

(Total for Question 4 is 9 marks)