7.

$$y = \arccos(\operatorname{sech} x) \qquad x > 0$$

(a) Show that

$$\frac{dy}{dx} = \operatorname{sech} x$$

(3)

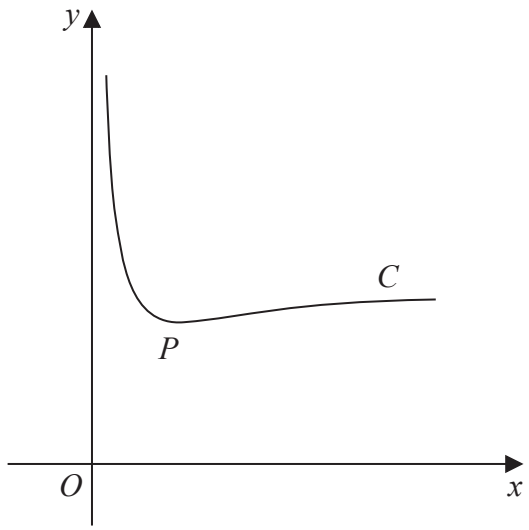


Figure 1

Figure 1 shows a sketch of part of the curve C with equation $y = f(x)$ where

$$f(x) = \arccos(\operatorname{sech} x) + \coth x \qquad x > 0$$

The point P is a minimum turning point of C

(b) Show that the x coordinate of P is $\ln\left(q + \sqrt{q}\right)$ where $q = \frac{1}{2}\left(1 + \sqrt{k}\right)$ and k is an integer to be determined.

(6)

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(Total for Question 7 is 9 marks)

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