1. (a) Find the first 4 terms of the binomial expansion, in ascending powers of x, of

$$\left(\frac{1}{4}-\frac{1}{2}x\right)^{-\frac{3}{2}} \qquad |x| < \frac{1}{2}$$

giving each term in simplest form.

(5)

Given that

$$\left(\frac{1}{4}-\frac{1}{2}x\right)^{n}\left(\frac{1}{4}-\frac{1}{2}x\right)^{-\frac{3}{2}} = \left(\frac{1}{4}-\frac{1}{2}x\right)^{\frac{1}{2}}$$

(b) write down the value of n.

(1)

(c) Hence, or otherwise, find the first 3 terms of the binomial expansion, in ascending powers of x, of

$$\left(\frac{1}{4}-\frac{1}{2}x\right)^{\frac{1}{2}} \qquad |x| < \frac{1}{2}$$

giving each term in simplest form.

(3)

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Question 1 continued

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Question 1 continued

(Total for Question 1 is 9 marks)

2.

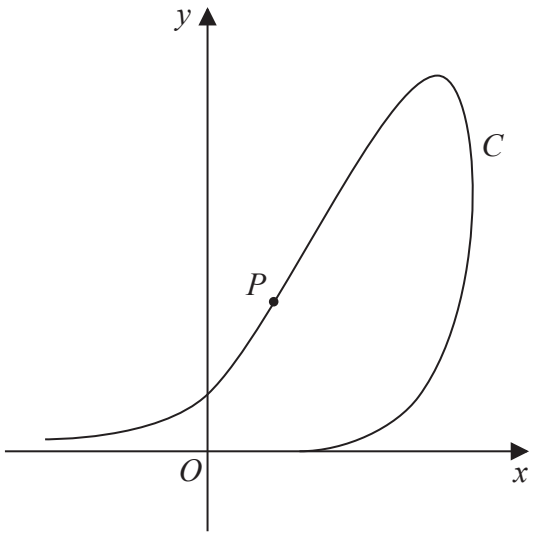


Figure 1

Figure 1 shows a sketch of part of the curve C with equation

$$2^x - 4xy + y^2 = 13 \qquad y \geqslant 0$$

The point P lies on C and has x coordinate 2

(a) Find the y coordinate of P.

(2)

(b) Find $\dfrac{\mathrm{d}y}{\mathrm{d}x}$ in terms of x and y.

(5)

The tangent to C at P crosses the x-axis at the point Q.

(c) Find the x coordinate of Q, giving your answer in the form $\dfrac{a\ln 2 + b}{c\ln 2 + d}$ where a, b, c and d are integers to be found.

(3)

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