

6 The complex number u is defined by

$$u = \frac{7+i}{1-i}$$

(a) Express u in the form $x + iy$, where x and y are real. [3]

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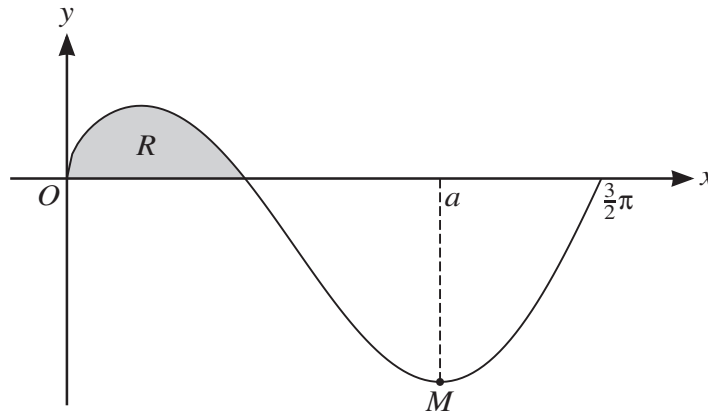
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(b) Show on a sketch of an Argand diagram the points A , B and C representing u , $7 + i$ and $1 - i$ respectively. [2]



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The diagram shows the curve $y = \sqrt{x} \cos x$, for $0 \leq x \leq \frac{3}{2}\pi$, and its minimum point M , where $x = a$. The shaded region between the curve and the x -axis is denoted by R .

- (a) Show that a satisfies the equation $\tan a = \frac{1}{2a}$. [3]

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- (b) The sequence of values given by the iterative formula $a_{n+1} = \pi + \tan^{-1}\left(\frac{1}{2a_n}\right)$, with initial value $x_1 = 3$, converges to a .

Use this formula to determine a correct to 2 decimal places. Give the result of each iteration to 4 decimal places. [3]

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