

MEI Core 3 Inverse Functions Questions Jan 05 - May 09

1 Given that $\arcsin x = \frac{1}{6}\pi$, find x . Find $\arccos x$ in terms of π . [3]

2 The function $f(x)$ is defined by $f(x) = 1 + 2\sin x$ for $-\frac{1}{2}\pi \leq x \leq \frac{1}{2}\pi$.

(i) Show that $f^{-1}(x) = \arcsin\left(\frac{x-1}{2}\right)$ and state the domain of this function. [4]

Fig. 6 shows a sketch of the graphs of $y = f(x)$ and $y = f^{-1}(x)$.

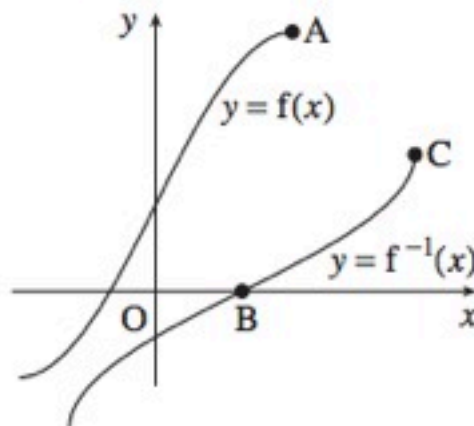


Fig. 6

(ii) Write down the coordinates of the points A, B and C. [3]

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- 3 Fig. 3 shows the curve defined by the equation $y = \arcsin(x - 1)$, for $0 \leq x \leq 2$.

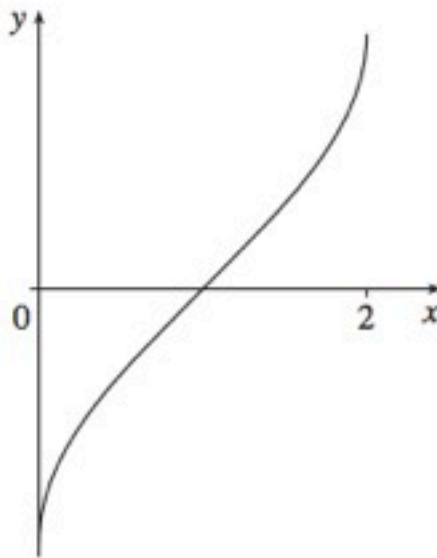


Fig. 3

- (i) Find x in terms of y , and show that $\frac{dx}{dy} = \cos y$. [3]
- (ii) Hence find the exact gradient of the curve at the point where $x = 1.5$. [4]
- 4 Fig. 6 shows the curve $y = f(x)$, where $f(x) = \frac{1}{2} \arctan x$.

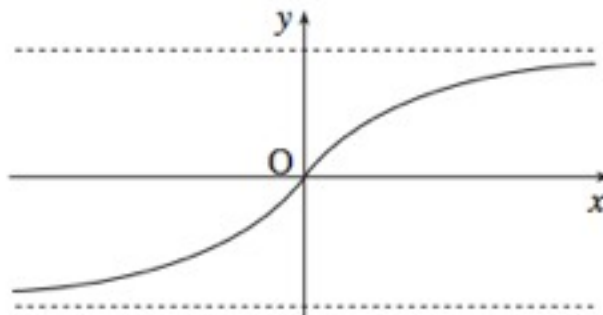


Fig. 6

- (i) Find the range of the function $f(x)$, giving your answer in terms of π . [2]
- (ii) Find the inverse function $f^{-1}(x)$. Find the gradient of the curve $y = f^{-1}(x)$ at the origin. [5]
- (iii) Hence write down the gradient of $y = \frac{1}{2} \arctan x$ at the origin. [1]

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5 Given that $f(x) = \frac{1}{2} \ln(x - 1)$ and $g(x) = 1 + e^{2x}$, show that $g(x)$ is the inverse of $f(x)$. [3]

6 Sketch the curve $y = 2 \arccos x$ for $-1 \leq x \leq 1$. [3]