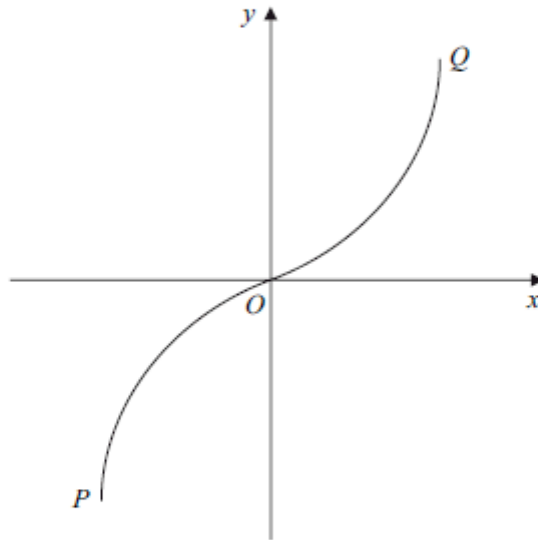


Core 3 Function Questions

- 7 (a) The sketch shows the graph of $y = \sin^{-1}x$.



Write down the coordinates of the points P and Q , the end-points of the graph.

(2 marks)

- (b) Sketch the graph of $y = -\sin^{-1}(x - 1)$.

(3 marks)

- 8 The functions f and g are defined with their respective domains by

$$f(x) = x^2 \quad \text{for all real values of } x$$

$$g(x) = \frac{1}{x+2} \quad \text{for real values of } x, \quad x \neq -2$$

- (a) State the range of f . (1 mark)
- (b) (i) Find $fg(x)$. (1 mark)
- (ii) Solve the equation $fg(x) = 4$. (4 marks)
- (c) (i) Explain why the function f does **not** have an inverse. (1 mark)
- (ii) The inverse of g is g^{-1} . Find $g^{-1}(x)$. (3 marks)
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4 (a) Sketch and label on the same set of axes the graphs of:

(i) $y = |x|$; *(1 mark)*

(ii) $y = |2x - 4|$. *(2 marks)*

(b) (i) Solve the equation $|x| = |2x - 4|$. *(3 marks)*

(ii) Hence, or otherwise, solve the inequality $|x| > |2x - 4|$. *(2 marks)*

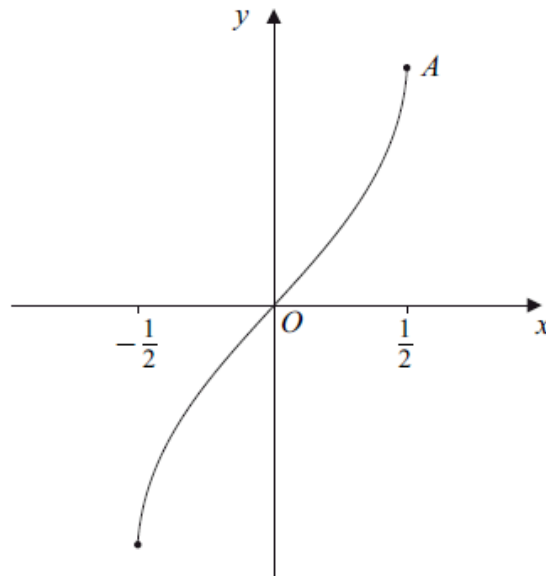
8 A function f is defined by $f(x) = 2e^{3x} - 1$ for all real values of x .

(a) Find the range of f . *(2 marks)*

(b) Show that $f^{-1}(x) = \frac{1}{3} \ln \left(\frac{x+1}{2} \right)$. *(3 marks)*

(c) Find the gradient of the curve $y = f^{-1}(x)$ when $x = 0$. *(4 marks)*

9 The diagram shows the curve with equation $y = \sin^{-1} 2x$, where $-\frac{1}{2} \leq x \leq \frac{1}{2}$.



(a) Find the y -coordinate of the point A , where $x = \frac{1}{2}$. *(1 mark)*

3 The functions f and g are defined with their respective domains by

$$f(x) = 3 - x^2, \text{ for all real values of } x$$

$$g(x) = \frac{2}{x+1}, \text{ for real values of } x, x \neq -1$$

(a) Find the range of f . *(2 marks)*

(b) The inverse of g is g^{-1} .

(i) Find $g^{-1}(x)$. *(3 marks)*

(ii) State the range of g^{-1} . *(1 mark)*

(c) The composite function gf is denoted by h .

(i) Find $h(x)$, simplifying your answer. *(2 marks)*

(ii) State the greatest possible domain of h . *(1 mark)*

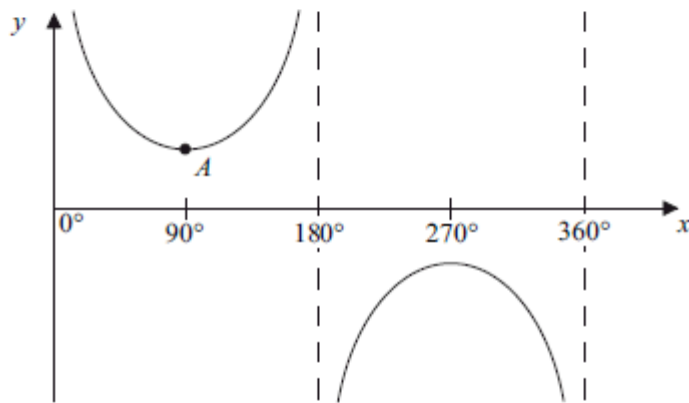
7 (a) Sketch the graph of $y = |2x|$. *(1 mark)*

(b) On a separate diagram, sketch the graph of $y = 4 - |2x|$, indicating the coordinates of the points where the graph crosses the coordinate axes. *(3 marks)*

(c) Solve $4 - |2x| = x$. *(3 marks)*

(d) Hence, or otherwise, solve the inequality $4 - |2x| > x$. *(2 marks)*

- 3 (a) Solve the equation $\operatorname{cosec} x = 2$, giving all values of x in the interval $0^\circ < x < 360^\circ$.
(2 marks)
- (b) The diagram shows the graph of $y = \operatorname{cosec} x$ for $0^\circ < x < 360^\circ$.



- (i) The point A on the curve is where $x = 90^\circ$. State the y -coordinate of A .
(1 mark)
- (ii) Sketch the graph of $y = |\operatorname{cosec} x|$ for $0^\circ < x < 360^\circ$.
(2 marks)
- (c) Solve the equation $|\operatorname{cosec} x| = 2$, giving all values of x in the interval $0^\circ < x < 360^\circ$.
(2 marks)
-

- 5 The functions f and g are defined with their respective domains by

$$f(x) = \sqrt{x-2} \quad \text{for } x \geq 2$$

$$g(x) = \frac{1}{x} \quad \text{for real values of } x, \quad x \neq 0$$

- (a) State the range of f .
(2 marks)
- (b) (i) Find $fg(x)$.
(1 mark)
- (ii) Solve the equation $fg(x) = 1$.
(3 marks)
- (c) The inverse of f is f^{-1} . Find $f^{-1}(x)$.
(3 marks)
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