

Functions Exam Questions (From OCR 4723)

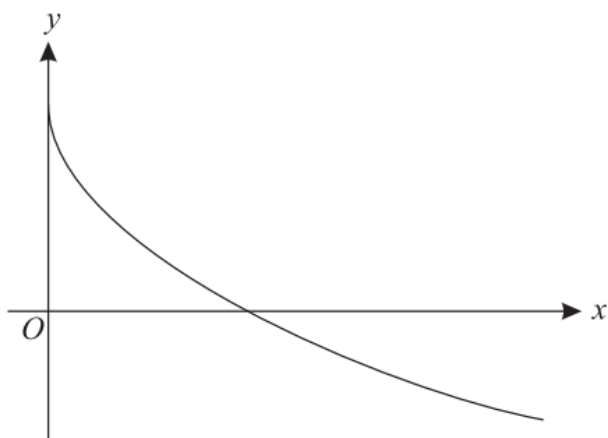
Q1, (June 2005, Q1)

The function f is defined for all real values of x by

$$f(x) = 10 - (x + 3)^2.$$

- (i) State the range of f . [1]
 - (ii) Find the value of $ff(-1)$. [3]
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Q2, (Jan 2006, Q4)



The function f is defined by $f(x) = 2 - \sqrt{x}$ for $x \geq 0$. The graph of $y = f(x)$ is shown above.

- (i) State the range of f . [1]
 - (ii) Find the value of $ff(4)$. [2]
 - (iii) Given that the equation $|f(x)| = k$ has two distinct roots, determine the possible values of the constant k . [2]
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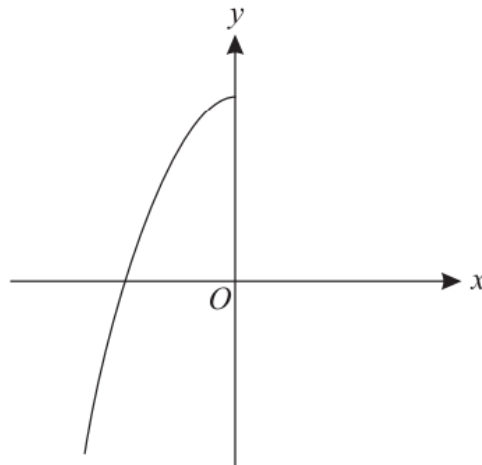
Q3, (Jun 2009, Q5)

The functions f and g are defined for all real values of x by

$$f(x) = 3x - 2 \quad \text{and} \quad g(x) = 3x + 7.$$

Find the exact coordinates of the point at which

- (i) the graph of $y = fg(x)$ meets the x -axis, [3]
 - (ii) the graph of $y = g(x)$ meets the graph of $y = g^{-1}(x)$, [3]
 - (iii) the graph of $y = |f(x)|$ meets the graph of $y = |g(x)|$. [4]
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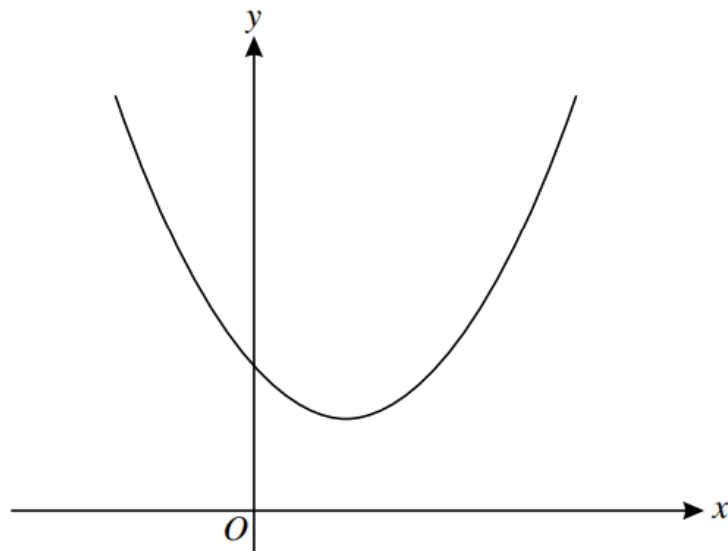


The diagram shows the graph of $y = f(x)$, where

$$f(x) = 2 - x^2, \quad x \leq 0.$$

- (i) Evaluate $ff(-3)$. [3]
- (ii) Find an expression for $f^{-1}(x)$. [3]
- (iii) Sketch the graph of $y = f^{-1}(x)$. Indicate the coordinates of the points where the graph meets the axes. [3]
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Q5, (Jan 2011, Q9ii)



The function g is defined for all real values of x by

$$g(x) = e^{2x} + ke^{-2x},$$

where k is a constant greater than 1. The graph of $y = g(x)$ is shown above. Find the range of g , giving your answer in simplified form. [5]

Q6, (Jan 2013, Q8)

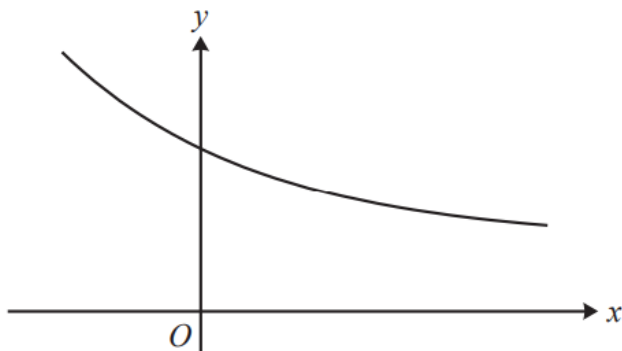
The functions f and g are defined for all real values of x by

$$f(x) = x^2 + 4ax + a^2 \quad \text{and} \quad g(x) = 4x - 2a,$$

where a is a positive constant.

- (i) Find the range of f in terms of a . [4]
 - (ii) Given that $fg(3) = 69$, find the value of a and hence find the value of x such that $g^{-1}(x) = x$. [6]
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Q7, (Jun 2013, Q7i,ii)



The diagram shows the curve $y = f(x)$, where f is the function defined for all real values of x by

$$f(x) = 3 + 4e^{-x}.$$

- (i) State the range of f . [1]
 - (ii) Find an expression for $f^{-1}(x)$, and state the domain and range of f^{-1} . [4]
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Q8, (Jun 2016, Q8)

The functions f and g are defined for all real values of x by

$$f(x) = |2x + a| + 3a \quad \text{and} \quad g(x) = 5x - 4a,$$

where a is a positive constant.

- (i) State the range of f and the range of g . [2]
 - (ii) State why f has no inverse, and find an expression for $g^{-1}(x)$. [3]
 - (iii) Solve for x the equation $gf(x) = 31a$. [5]
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