

FUNCTIONS: INVERSE FUNCTIONS

A2 Unit 3: Pure Mathematics B

WJEC past paper questions: 2010 – 2017

Total marks available 80 (approximately 1 hour 40 minutes)

1.

The function f has domain $[1, \infty)$ and is defined by

$$f(x) = \ln(3x - 2) + 5.$$

(a) Find an expression for $f^{-1}(x)$. [4]

(b) State the domain of f^{-1} . [1]

(Summer 10)

2.

The function f has domain $(-\infty, -1]$ and is defined by

$$f(x) = 4x^2 - 3.$$

(a) Write down the range of f . [1]

(b) Find an expression for $f^{-1}(x)$ and write down the range and domain of f^{-1} . [5]

(c) (i) Evaluate $f^{-1}(6)$.

(ii) By carrying out an appropriate calculation involving f , verify that your answer to part (i) is correct. [3]

(January 11)

3.

The function f has domain $(-\infty, -\frac{1}{2})$ and is defined by

$$f(x) = e^{2x+1} - 3.$$

(a) Find an expression for $f^{-1}(x)$. [4]

(b) Write down the domain of f^{-1} . [2]

(Summer 11)

4. The function f has domain $[6, \infty)$ and is defined by

$$f(x) = 3 - \frac{1}{\sqrt{x-2}}.$$

- (a) Find an expression for $f^{-1}(x)$. [4]
 (b) Write down the domain of f^{-1} . [2]

(January 12)

5. The function f has domain $(-\infty, 0)$ and is defined by

$$f(x) = \frac{x^2 + 3}{x^2 + 5}.$$

- (a) (i) Show that $f'(x)$ is always negative.
 (ii) Write down the range of f . [6]
 (b) (i) Find an expression for $f^{-1}(x)$.
 (ii) Write down the range and domain of f^{-1} . [5]

(Summer 12)

6. The function f has domain $[-1, \infty)$ and is defined by

$$f(x) = \ln(4x + 5) - 2.$$

- (a) Find an expression for $f^{-1}(x)$. [4]
 (b) State the domain of f^{-1} . [1]

(January 13)

7. The function f has domain $(-\infty, 10]$ and is defined by

$$f(x) = e^{5-\frac{x}{2}} + 6.$$

- (a) Find an expression for $f^{-1}(x)$. [4]
 (b) Write down the domain of f^{-1} . [2]

(Summer 13)

8. The function f has domain $[7, \infty)$ and is defined by

$$f(x) = 1 + \frac{2}{\sqrt{3x-5}}.$$

- (a) Find an expression for $f^{-1}(x)$. [4]
 (b) Write down the domain of f^{-1} . [2]

(January 14)

9. The function f has domain $(-\infty, 4)$ and is defined by

$$f(x) = x^2 - 8x + 7.$$

- (a) Express $f(x)$ in the form

$$f(x) = (x + a)^2 + b,$$

where a, b are constants whose values are to be found. [1]

- (b) Hence or otherwise, find an expression for $f^{-1}(x)$. [4]

(Summer 14)

10. The functions f and g have domains $[7, 60]$ and $[9, \infty)$ respectively and are defined by

$$\begin{aligned} f(x) &= 2\ln(4x + 5) + 3, \\ g(x) &= e^x. \end{aligned}$$

- (i) Find an expression for $f^{-1}(x)$.
 (ii) Write down the domain of f^{-1} , giving the end-points of your domain correct to the nearest integer.
 (iii) Write down an expression for $gf(x)$ and simplify your answer. [9]

(Summer 15)

11. The function f has domain $(-\infty, 12]$ and is defined by

$$f(x) = e^{4 - \frac{x}{3}} + 8.$$

- (a) Find an expression for $f^{-1}(x)$. [4]

- (b) Write down the domain of f^{-1} . [2]

(Summer 16)

12. The function f has domain $[8, \infty)$ and is defined by

$$f(x) = 2 + \frac{3}{\sqrt{5x-4}}.$$

- (a) Find an expression for $f^{-1}(x)$. [4]
- (b) Write down the domain of f^{-1} . [2]