

Functions

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20 $f(x) = (x - 1)^3$ $g(x) = (x - 1)^2$ $h(x) = 3x + 1$

(a) Work out $fg(-1)$.

Answer(a) [2]

(b) Find $gh(x)$ in its simplest form.

Answer(b) [2]

(c) Find $f^{-1}(x)$.

Answer(c) [2]

18

$$f(x) = x^2 + 2$$

$$g(x) = (x + 2)^2$$

$$h(x) = 3x - 5$$

Find

(a) $gf(-2)$,

Answer(a) [2]

(b) $h^{-1}(22)$.

Answer(b) [2]

25 $f: x \rightarrow 2x - 7$ $g: x \rightarrow \frac{1}{x}$

Find

(a) $fg\left(\frac{1}{2}\right)$,

Answer(a) [2]

(b) $gf(x)$,

Answer(b) $gf(x) =$ [1]

(c) $f^{-1}(x)$.

Answer(c) $f^{-1}(x) =$ [2]

20

$$f(x) = x^3$$

$$g(x) = 2x - 3$$

(a) Find

(i) $g(6)$,

Answer(a)(i) [1]

(ii) $f(2x)$.

Answer(a)(ii) [1]

(b) Solve $fg(x) = 125$.

Answer(b) $x =$ [3]

(c) Find the inverse function $g^{-1}(x)$.

Answer(c) $g^{-1}(x) =$ [2]

5) June 2011 V2

19 $f(x) = x^2$ $g(x) = 2^x$ $h(x) = 2x - 3$

- (a) Find $g(3)$.

Answer(a) [1]

- (b) Find $hh(x)$ in its simplest form.

Answer(b) [2]

- (c) Find $fg(x + 1)$ in its simplest form.

Answer(c) [2]

17

$$f(x) = \frac{1}{x+4} \quad (x \neq -4)$$

$$g(x) = x^2 - 3x$$

$$h(x) = x^3 + 1$$

- (a) Work out $fg(1)$.

Answer(a) [2]

- (b) Find $h^{-1}(x)$.

Answer(b) $h^{-1}(x) =$ [2]

- (c) Solve the equation $g(x) = -2$.

Answer(c) $x =$ or $x =$ [3]

18

$$f(x) = (x + 2)^3 - 5$$

$$g(x) = 2x + 10$$

$$h(x) = \frac{1}{x}, \quad x \neq 0$$

Find

(a) $gf(x)$,

Answer(a) $gf(x) = \dots$ [2]

(b) $f^{-1}(x)$,

Answer(b) $f^{-1}(x) = \dots$ [3]

(c) $gh\left(-\frac{1}{5}\right)$.

Answer(c) \dots [2]

8) November 2012 V1

20

$$f(x) = 4(x + 1) \quad g(x) = \frac{x^3}{2} - 1$$

- (a) Write down the value of x when $f^{-1}(x) = 2$.

Answer(a) $x = \dots$ [1]

- (b) Find $fg(x)$. Give your answer in its simplest form.

Answer(b) $fg(x) = \dots$ [2]

- (c) Find $g^{-1}(x)$.

Answer(c) $g^{-1}(x) = \dots$ [3]

19 $f(x) = x^2 + 1$ $g(x) = \frac{x+2}{3}$

(a) Work out $ff(-1)$.

Answer(a) [2]

(b) Find $gf(3x)$, simplifying your answer as far as possible.

Answer(b) $gf(3x) =$ [3]

(c) Find $g^{-1}(x)$.

Answer(c) $g^{-1}(x) =$ [2]

21

$$f(x) = 5x + 4$$

$$g(x) = \frac{1}{2x}, \quad x \neq 0$$

$$h(x) = \left(\frac{1}{2}\right)^x$$

Find

(a) $fg(5)$,

Answer(a) [2]

(b) $gg(x)$ in its simplest form,

Answer(b) $gg(x) = \dots$ [2]

(c) $f^{-1}(x)$,

Answer(c) $f^{-1}(x) = \dots$ [2]

(d) the value of x when $h(x) = 8$.

Answer(d) $x = \dots$ [2]

16

$$f(x) = x + \frac{2}{x} - 3, \quad x \neq 0$$

$$g(x) = \frac{x}{2} - 5$$

Find

(a) $fg(18)$,

Answer(a) [2]

(b) $g^{-1}(x)$.

Answer(b) $g^{-1}(x) =$ [2]

19 $f(x) = 2x + 3$ $g(x) = x^2$

(a) Find $fg(6)$.

Answer(a) [2]

(b) Solve the equation $gf(x) = 100$.

Answer(b) $x = \dots$ or $x = \dots$ [3]

(c) Find $f^{-1}(x)$.

Answer(c) $f^{-1}(x) = \dots$ [2]

(d) Find $ff^{-1}(5)$.

Answer(d) [1]

20

$$f(x) = 3x - 2 \quad g(x) = \frac{2}{x+1}, \quad x \neq -1$$

- (a) Find $gf(2)$.

Answer(a) [2]

- (b) Solve $g(x) = 10$.

Answer(b) $x = \dots$ [2]

- (c) Simplify.

$$f(2x) - f(x+2)$$

Answer(c) [3]

16

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

$$g(x) = \frac{x-1}{4}$$

$$h(x) = x^3$$

Find

(a) $hf(1)$,

Answer(a) [2]

(b) $g^{-1}(x)$,

Answer(b) $g^{-1}(x) = \dots$ [2]

(c) $gh(x)$,

Answer(c) $gh(x) = \dots$ [1]

(d) the solution to the equation $f(x) = 0$.

Answer(d) $x = \dots$ [1]

23

$$f(x) = 5 - 3x$$

- (a) Find $f(6)$.

Answer(a) [1]

- (b) Find $f(x + 2)$.

Answer(b) [1]

- (c) Find $ff(x)$, in its simplest form.

Answer(c) [2]

- (d) Find $f^{-1}(x)$, the inverse of $f(x)$.

Answer(d) $f^{-1}(x) = \dots$ [2]

21

$$f(x) = x^2 + 4x - 6$$

- (a) $f(x)$ can be written in the form $(x + m)^2 + n$.

Find the value of m and the value of n .

Answer(a) $m = \dots$

$n = \dots$ [2]

- (b) Use your answer to part (a) to find the positive solution to $x^2 + 4x - 6 = 0$.

Answer(b) $x = \dots$ [2]

24

$$f(x) = 3x + 5 \quad g(x) = x^2$$

- (a) Find $g(3x)$.

Answer(a) [1]

- (b) Find $f^{-1}(x)$, the inverse function.

Answer(b) $f^{-1}(x) =$ [2]

- (c) Find $ff(x)$.

Give your answer in its simplest form.

Answer(c) [2]

21

$$f(x) = x^3$$

$$g(x) = 3x - 5$$

$$h(x) = 2x + 1$$

Work out

- (a) $ff(2)$,

Answer(a) [2]

- (b) $gh(x)$ and simplify your answer,

Answer(b) [2]

- (c) $h^{-1}(x)$, the inverse of $h(x)$.

Answer(c) $h^{-1}(x) =$ [2]

22

$$f(x) = 5x - 3$$

$$g(x) = x^2$$

- (a) Find $fg(-2)$.

Answer(a) [2]

- (b) Find $gf(x)$, in terms of x , in its simplest form.

Answer(b) [2]

- (c) Find $f^{-1}(x)$.

Answer(c) $f^{-1}(x) = \dots$ [2]

18

$$f(x) = x^2$$

$$g(x) = \frac{x}{2}^3$$

Find

(a) $f(-5)$,

..... [1]

(b) $gf(x)$,

..... [1]

(c) $g^{-1}(x)$.

$$g^{-1}(x) = \dots \quad [2]$$