

Functions - Section Test

(Answers)

1)

$$f(x) = 1 - x^2$$

$$\begin{aligned} f(0.5) &= 1 - 0.5^2 \\ &= 1 - 0.25 \\ &= 0.75 \end{aligned}$$

2)

The smallest possible value of $f(x)$ where $-1 \leq x \leq 1$ is 0, when $x = \pm 1$.

The greatest possible value of $f(x)$ where $-1 \leq x \leq 1$ is 1, when $x = 0$.

So the range of the function is given by $0 \leq f(x) \leq 1$.

3)

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

$$\begin{aligned} f(-4) &= (-4)^2 - (-4) - 6 \\ &= 16 + 4 - 6 \\ &= 14 \end{aligned}$$

4)

$$\begin{aligned} f(2x) &= (2x)^2 - (2x) - 6 \\ &= 4x^2 - 2x - 6 \end{aligned}$$

5)

$$f(x) = \frac{1}{x^2 + x - 2} = \frac{1}{(x+2)(x-1)}$$

The denominator is zero at $x = -2$ and $x = 1$, so the function is not defined at these points. So, the domain is all values of x except $x = -2$ and $x = 1$.

$a < b$ so $a = -2$ and $b = 1$

6)

$$f(x) = x^2 \text{ and } g(x) = x - 1$$

$$f(g(x)) = f(x - 1) = (x - 1)^2$$

$$\text{For } f(g(6)), x = 6$$

$$\text{So, } f(g(6)) = (6 - 1)^2 = 5^2 = 25$$

7)

$$f(x) = x^2 \text{ and } g(x) = (x+1)^3$$

$$f(g(x)) = f((x+1)^3) = ((x+1)^3)^2 = (x+1)^6$$

8)

f and g are inverse functions so $g(x) = f^{-1}(x)$

$$\text{So, } g(1) + g(3) = f^{-1}(1) + f^{-1}(3)$$

$$\text{Since } f(1) = 3, 1 = f^{-1}(3)$$

$$\text{Since } f(3) = 1, 3 = f^{-1}(1)$$

$$\text{So, } g(1) + g(3) = f^{-1}(1) + f^{-1}(3) = 3 + 1 = 4$$

9)

Rearrange to make x the subject

$$f(x) = x + 3$$

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

Let $x = g(x)$ and $f(x) = x$

So, the inverse function is $g(x) = x - 3$ and $c = -3$

10)

Rearrange to make x the subject

$$f(x) = ax + b$$

$$ax = f(x) - b$$

$$x = \frac{f(x) - b}{a}$$

Let $x = g(x)$ and $f(x) = x$

So, the inverse function is $g(x) = \frac{x - b}{a}$