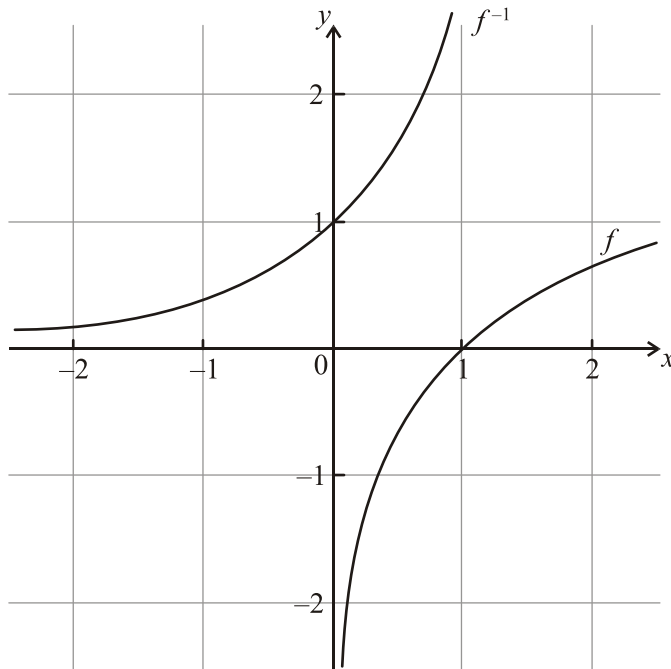


Functions Quiz 1 KEY

1.

(a)



A1A1A1 N3

Note: Award A1 for approximate reflection of f in y = x, A1 for y intercept at 1, and A1 for curve asymptotic to x axis.

(b) $y > 0$ or $f^{-1}(x) > 0$

A1

[4]

2. $\sqrt{3-2x} = 5$
 $3-2x = 25$
 $-2x = 22$
 $x = -11$

(M1)
 (A1)
 (A1)
 (A1) (C4)

OR

Let $y = \sqrt{3-2x}$
 $\Rightarrow y^2 = 3-2x$
 $\Rightarrow x = \frac{3-y^2}{2}$
 $\Rightarrow f^{-1}(x) = \frac{3-x^2}{2}$
 $\Rightarrow f^{-1}(5) = \frac{3-25}{2}$
 $= -11$

(M1)
 (A1)
 (M1)
 (A1) (C4)

[4]

Functions Quiz 1 KEY

3. (a) (i) $\sqrt{6}$ A1 N1
 (ii) 9 A1 N1
 (iii) 0 A1 N1

(b) $x < 5$ A2 N2

(c) $(g \circ f)(x) = (\sqrt{x-5})^2$ (M1)
 $= x - 5$ A1 N2

[7]

4. (a) for interchanging x and y (may be done later) (M1)
e.g. $x = 2y - 3$
 $g^{-1}(x) = \frac{x+3}{2}$ (accept $y = \frac{x+3}{2}, \frac{x+3}{2}$) A1 N2

(b) **METHOD 1**
 $g(4) = 5$ (A1)
 evidence of composition of functions (M1)
 $f(5) = 25$ A1 N3

METHOD 2
 $f \circ g(x) = (2x - 3)^2$ (M1)
 $f \circ g(4) = (2 \times 4 - 3)^2$ (A1)
 $= 25$ A1 N3

[5]

5. (a) $(f \circ g): x \mapsto 3(x + 2)$ ($= 3x + 6$) A2 N2

(b) **METHOD 1**
 Evidence of finding inverse functions M1
e.g. $f^{-1}(x) = \frac{x}{3}$ $g^{-1}(x) = x - 2$
 $f^{-1}(18) = \frac{18}{3} (= 6)$ (A1)
 $g^{-1}(18) = 18 - 2 (= 16)$ (A1)
 $f^{-1}(18) + g^{-1}(18) = 6 + 16 = 22$ A1 N3

METHOD 2
 Evidence of solving equations M1
e.g. $3x = 18, x + 2 = 18$
 $x = 6, x = 16$ (A1)(A1)
 $f^{-1}(18) + g^{-1}(18) = 6 + 16 = 22$ A1 N3

[6]

Functions Quiz 1 KEY

6. (a) **METHOD 1**

$$(f \circ g)(4) = f(g(4)) = f(1) \\ = 2$$

(M1)

(A1) (C2)

METHOD 2

$$(f \circ g)(x) = \frac{2}{x-3}$$

(M1)

$$(f \circ g)(4) = 2$$

(A1) (C2)

(b) Let $y = \frac{1}{x-3}$

Correct simplification $y(x-3) = 1 \quad \left(x-3 = \frac{1}{y} \right)$

(A1)

$$x = \frac{1}{y} + 3 \quad \left(= \frac{1+3y}{y} \right)$$

(A1)

Interchanging x and y (may happen earlier)

(M1)

$$y = \frac{1}{x} + 3 \quad \left(= \frac{1+3x}{x} \right)$$

(C3)

(c) $x \neq 0$ ($\{0\}$ etc)

(A1) (C1)

[6]