Section 2: Composite and inverse functions

Exercise level 1

1. The functions f, g and h are defined as:

$$f(x) = 1 - x \qquad g(x) = x^2 \qquad h(x) = \frac{1}{x}$$

Find the following composite functions:

(i) $fg(x)$ (ii) $gh(x)$ (iii) $gfh(x)$

(iv) $fhg(x)$ (v) $f^2(x)$ (vi) $h^2(x)$

2. The functions s and t are defined as:

$$s(x) = \sqrt{x} \qquad t(x) = x + 2$$

Express the following functions in terms of s and t.

(i) $\sqrt{x+2}$ (ii) $\sqrt{x}+2$ (iii) $x+4$

3. Find the inverses of each of the following functions.

(i) $f(x) = 3x^3 - 1$

(ii) $f(x) = \dfrac{x+2}{x-1}$

(iii) $f(x) = 1 - \dfrac{2}{x}$

4. The functions f and g are defined by:

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

Find:

(i) $f^{-1}(x)$ (ii) $g^{-1}(x)$ (iii) $fg(x)$

(iv) $(fg)^{-1}(x)$ (v) $gf(x)$ (vi) $(gf)^{-1}(x)$

(vii) $f^{-1}g^{-1}(x)$ (viii) $g^{-1}f^{-1}(x)$

What do you notice about the inverse of a composite function?