11 Functions f and g are defined by

$$\mathrm{f} : x \mapsto k - x \quad \text{for } x \in \mathbb{R}, \text{ where } k \text{ is a constant,}$$
$$\mathrm{g} : x \mapsto \frac{9}{x+2} \quad \text{for } x \in \mathbb{R},\ x \neq -2.$$

(i) Find the values of k for which the equation $\mathrm{f}(x) = \mathrm{g}(x)$ has two equal roots and solve the equation $\mathrm{f}(x) = \mathrm{g}(x)$ in these cases. [6]

(ii) Solve the equation $\mathrm{fg}(x) = 5$ when $k = 6$. [3]

(iii) Express $\mathrm{g}^{-1}(x)$ in terms of x. [2]