9 Functions f and g are defined for $x \in \mathbb{R}$ by

$$\mathrm{f} : x \mapsto \tfrac{1}{2}x - 2,$$
$$\mathrm{g} : x \mapsto 4 + x - \tfrac{1}{2}x^2.$$

(i) Find the points of intersection of the graphs of $y = \mathrm{f}(x)$ and $y = \mathrm{g}(x)$. [3]

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(ii) Find the set of values of x for which $\mathrm{f}(x) > \mathrm{g}(x)$. [2]

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(iii) Find an expression for $\mathrm{fg}(x)$ and deduce the range of fg. [4]

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The function h is defined by $\mathrm{h} : x \mapsto 4 + x - \frac{1}{2}x^2$ for $x \geqslant k$.

(iv) Find the smallest value of k for which h has an inverse. [2]

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