9 **(a)** The function f is defined, for all real x, by $\mathrm{f}(x) = 13 - 4x - 2x^2$.

(i) Write $\mathrm{f}(x)$ in the form $a + b(x + c)^2$, where a, b and c are constants. [3]

(ii) Hence write down the range of f. [1]

(b) The function g is defined, for $x \geqslant 1$, by $\mathrm{g}(x) = \sqrt{x^2 + 2x - 1}$.

(i) Given that $\mathrm{g}^{-1}(x)$ exists, write down the domain and range of g^{-1}. [2]

(ii) Show that $\mathrm{g}^{-1}(x) = -1 + \sqrt{px^2 + q}$, where p and q are integers. [4]

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