8 The function $f : x \mapsto x^2 - 4x + k$ is defined for the domain $x \geqslant p$, where k and p are constants.

   (i) Express $f(x)$ in the form $(x + a)^2 + b + k$, where a and b are constants.   [2]

  (ii) State the range of f in terms of k.   [1]

 (iii) State the smallest value of p for which f is one-one.   [1]

 (iv) For the value of p found in part **(iii)**, find an expression for $f^{-1}(x)$ and state the domain of f^{-1}, giving your answers in terms of k.   [4]