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Inverse functions - Quadratic type |Past Paper Question | P1 CIE June 2013 Q8(iv)

(i) Express $2x^2 - 12x + 13$ in the form $a(x+b)^2 + c$, where a , b and c are constants. [3]

(ii) The function f is defined by $f(x) = 2x^2 - 12x + 13$ for $x \geq k$, where k is a constant.

It is given that f is a one-one function. State the smallest possible value of k . [1]

The value of k is now given to be 7.

(iii) Find the range of f . [1] Ans: $f(x) \geq 27$

(iv) Find an expression for $f^{-1}(x)$ and state the domain of f^{-1} . [5]

$$f(x) = 2(x-3)^2 - 5$$

$$\text{let } x = 2(y-3)^2 - 5$$

$$\therefore x+5 = 2(y-3)^2$$

$$\therefore \frac{x+5}{2} = (y-3)^2$$

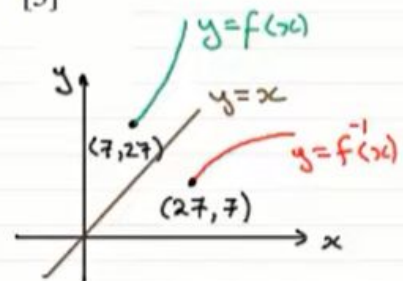
$$\therefore y-3 = \pm \sqrt{\frac{x+5}{2}}$$

$$\therefore y = 3 \pm \sqrt{\frac{x+5}{2}}$$

Since $y \geq 7$

$$\therefore f^{-1}(x) = 3 + \sqrt{\frac{x+5}{2}}$$

Domain: $x \geq 27$



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