

2. (i) Show that  $x^2 - 8x + 17 > 0$  for all real values of  $x$

(3)

(ii) "If I add 3 to a number and square the sum, the result is greater than the square of the original number."

State, giving a reason, if the above statement is always true, sometimes true or never true.

(2)

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$$\begin{aligned} \text{(i)} \quad & x^2 - 8x + 17 \\ &= (x - 4)^2 - 16 + 17 \\ &= (x - 4)^2 + 1 \\ &\quad \underbrace{\hspace{2cm}}_{>0} > 0 \end{aligned}$$

If you complete the square that gives a term which must be  $> 0$ . If what is left is  $> 0$  then the problem is solved

Hence  $x^2 - 8x + 17 > 0$

(ii) Take a +ve number eg 1

$$(1+3)^2 = 4^2 \text{ which is greater than } 1^2 \text{ so true if number is 1}$$

$$\text{Take } -2 \quad (-2+3)^2 = 1^2 \text{ which is less than } (-2)^2 = 4.$$

so false for -2

So the statement is only sometimes true