15. (i) Show that $k^2 - 4k + 5$ is positive for all real values of k.

(2)

(ii) A student was asked to prove by contradiction that

"There are no positive integers x and y such that $(3x + 2y)(2x - 5y) = 28$"

The start of the student's proof is shown below.

> Assume that positive integers x and y exist such that
> $$(3x + 2y)(2x - 5y) = 28$$
>
> If $3x + 2y = 14$ and $2x - 5y = 2$
>
> $$\left. \begin{array}{r} 3x + 2y = 14 \\ 2x - 5y = 2 \end{array} \right\} \Rightarrow x = \frac{74}{19},\ y = \frac{22}{19} \text{ Not integers}$$

Show the calculations and statements needed to complete the proof.

(4)