Worksheet 4 Review 2

April 12, 2020

Question 1

a. $\exists n \in \mathbb{N},\ n > 3 \wedge n^2 - 1.5n \geq 5$

b. The variable is existentially quantified

c. Because the variable is existentially quantified, the variable's value should be a *concrete* natural number

d. **Statement:** $\exists n \in \mathbb{N},\ n > 3 \wedge n^2 - 1.5n \geq 5$

Proof. Let $n = 5$.

We will prove $n > 3 \wedge n^2 - 1.5n \geq 5$.

First, we need to prove $n > 3$.

The header tells us $n = 5$.

Using this fact, we can conclude $n > 3$.

Now, we need to show $n^2 - 1.5n \geq 5$.

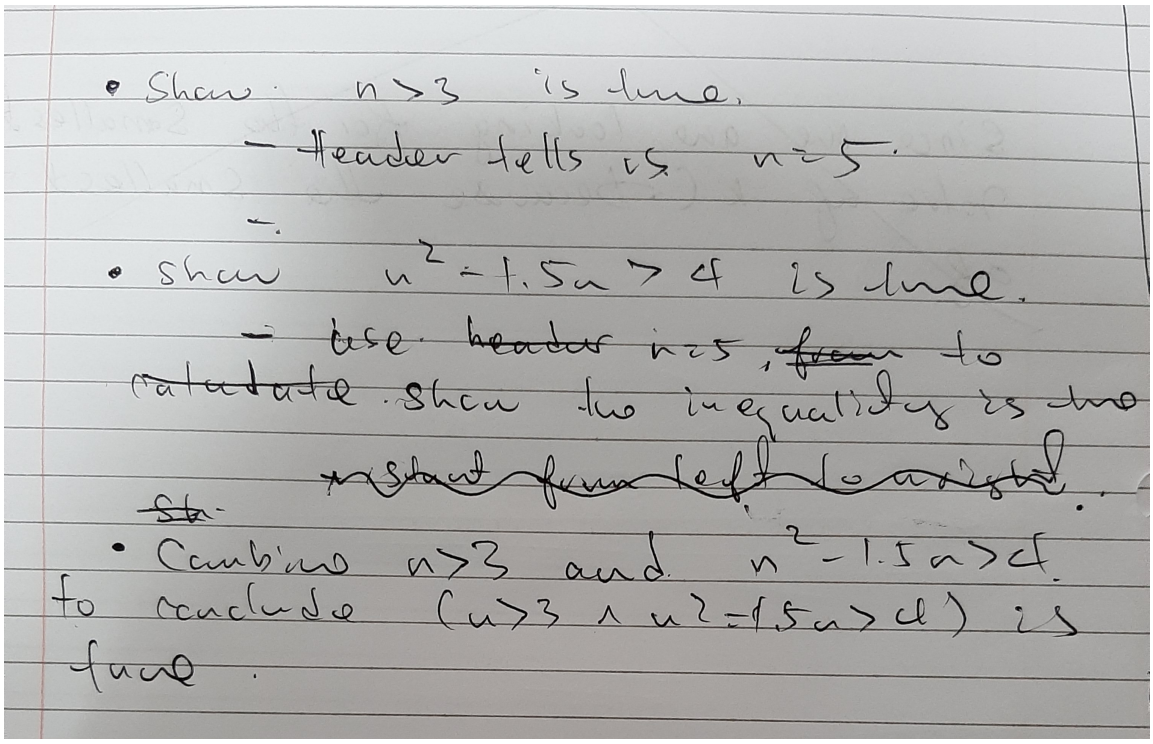
Using the fact $n = 5$, we can calculate

$$\begin{aligned} n^2 - 1.5n &= 25 - 7.5 && (1)\\ &= 17.5 && (2)\\ &\geq 5 && (3) \end{aligned}$$

Finally, since $n > 3$ and $n^2 - 1.5n \geq 5$ are true, we can conclude $n > 3 \wedge n^2 - 1.5n \geq 5$ are true. □

Notes:

- Used the following pseudoproof used for this problem. Proof really feels smoother.



e. $\forall n \in \mathbb{N},\ n \geq 3 \Rightarrow n^2 - 1.5n > 4$

f. The variable is universally quantified.

g. Because the variable is universally quantified, the variable's value should be an arbitrary natural number.

Question 2

Question 3