

Worksheet 7 Solution

March 26, 2020

Question 1

1. Assume that $n \leq 1$.

Then, it follows from the assumption that the statement holds for the case $n \leq 1$.

Correct Solution:

Assume that $n \leq 1$.

Then, the assumption satisfies the first part of the OR we want to prove.

Notes:

- the professor specifically states the assumption satisfies the first part of the OR we want to prove.

2. Assume $\exists k, d \in \mathbb{N}, n = kd \wedge d \neq 1 \wedge d \neq n$.

Let $a = d$ and $b = k$.

We will divide proof into parts and combine them together.

Part 1 ($n \nmid a$):

Since $\frac{1}{k} \cdot n = d$, k must be 1 for n to divide d .

Then, because we know $d \neq n$, we can conclude that $n \nmid a$.

Part 2 ($n \nmid b$):

Since $\frac{1}{d} \cdot n = k$, d must be 1 for n to divide k .

Then, because we know $d \neq 1$, we can conclude $n \nmid b$.

Part 3 ($n \mid ab$):

Since $ab = n$ and $\forall n \in \mathbb{N}$, $n \mid n$, we can conclude that $n \mid ab$.

Then, it follows from the result of part 1, part 2 and part 3 that the second part of the OR is true.

Notes:

- **Definition of Divisibility:** Let $a, d \in \mathbb{Z}$. There exists $k \in \mathbb{Z}$,
 $n = dk$

Question 2

Question 3