Review #1

9/22/2020

Q1. What is wrong with this proof that "$1=2$"?

We use these steps, where a and b are two equal positive integers.

Step	Reason
1. $a=b$	Given
2. $a^2=ab$	Multiply both sides of (1) by a
3. $a^2-b^2=ab-b^2$	Subtract b^2 from both sides of (2)
4. $(a-b)(a+b)=b(a-b)$	factor both sides of (3)
5. $a+b=b$	Divide both sides of (4) by $a-b$

6. $2b = b$ replace a by b in (5), because, $a = b$ and simplify

7. $2 = 1$ Divide both sides of (6) by b.

Q2. What is powerset of $A = \{a, \{a\}\}$?

Q3. Use induction definition to define

$A = \{1, 2, 3, 5, 6, 7, 9, 11, 13, 15, 17, 18, 19, \ldots\}$

Q4. Truth table for

$p \wedge T \Rightarrow \neg p$

Q5: prove by induction : $n \in \mathbb{N}, n \geq 1$

$$1.1! + 2.2! + \dots + n.n! = (n+1)! - 1$$

Q6: What is the cardinality of A?

$$A = \{ a, \{a\}, \{a, \{a\}\} \}$$

Q7: Determine whether each of these conditional statements is true or false:

a) if $1+1=2$, then $2+2=5$.

b) if $1+1=3$, then $2+2=4$.

Q8: Determine whether those statements are True or false:

a) $\{\phi\} \in \{\phi, \{\phi\}\}$

b) $\{\phi\} \subseteq \{\phi\}$

c) $\phi \in \{\{\phi\}\}$

Q9: Prove: if n is a positive integer, then n is odd if and only if $5n+6$ is odd