Warm-Ups 02

This is a preview of the published version of the quiz

Started: Mar 4 at 12:48pm

Quiz Instructions

Please attend/watch Lecture 02 and optionally read the **Recommended Lecture Readings**, and then answer these questions.

Question 1 4 pts

The proof below attempts to prove that $\sqrt{4}$ is irrational. This proof can't possibly be valid, since $\sqrt{4}$ is not irrational!, so at least one of the statements in the attempted proof below must be false. What is the **first false** statement?

- For the sake of contradiction, assume the claim is false, i.e., assume $\sqrt{4}$ is rational.
- We can write $\sqrt{4} = n/d$, where n and d are integers with no common factor.
- Squaring both sides and moving d^2 to the other side, we get $4d^2 = n^2$.
- This implies n^2 is a multiple of 4, and thus 4 is a factor of n.
- It follows that n^2 is a multiple of 16.
- But since $4d^2 = n^2$, we find that d^2 must also be a multiple of 4.
- So d is even.
- Then n and d both share a factor of 2, which is a contradiction.

Question 2 3 pts

Let $P(n)$ be the predicate $1 + 2 + \cdots + n = n(n+1)/2$. What is the meaning of $P(2)$?

- $1 + 2 + \cdots + n = n(n+1)/2$
- $n = 2$
- $P(1)$ \implies $P(2)$
- $1 + 2 = 2(2+1)/2$
- $1 = 1(1+1)/2$

Question 3 3 pts

In the bogus induction proof that all horses are the same color (see page 145), where does the induction break down and why?

- $P(1)$, because the base case should be $P(0)$
- $P(1) \implies P(2)$, because there are no middle horses when $n = 2$
- $P(2) \implies P(3)$, because there is only one middle horse
- $P(n) \implies P(n+1)$ for $n \geq 3$, because the order of the horses is important

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