

DSII: Quiz 1

Name:

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1. Simplify $\neg((A \rightarrow B) \vee C)$ using logical equivalences. Show each step and identify which law or rule you applied at each stage.

Solution:

2. Using the arithmetic series formula $S = \frac{n(n+1)}{2}$, find the sum of the first 12 positive integers. Show your work.

Solution:

3. A proof by induction has two required components. Name each component and briefly describe its purpose in the proof.

Solution:

4. Using the predicates defined below, write a first-order logic formula that correctly translates the sentence: “*Every course has at least one student who has not passed it.*”

$C(x)$ x is a course

$S(y)$ y is a student

$P(y, x)$ student y passed course x

Solution:

5. Evaluate $\sum_{i=1}^4 i^2$ using the sum-of-squares formula $\sum_{i=1}^n i^2 = \frac{n(n+1)(2n+1)}{6}$. Show your substitution and simplification steps.

Solution:

6. To prove $P \rightarrow Q$ by contradiction, you begin by assuming the negation of the implication. State what expression you must assume to be true and justify your answer using a logical equivalence.

Solution: