In The Name Of God

The Most Compassionate And Merciful

Home Work 3

Proof and Inference

Sheet info :

- Home Work 3
- Due Date : Sunday , 28th of Mehr - 12:30 p.m.
- No Need To Upload Your Files
- Write Your Name and Student Number On **All** of The Papers
- Attention : You **Must** give your physical **answer sheets** to the grader in the class

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1)

$\forall a, b \in \mathbb{Q}$ with $b \neq 0$, if r is an irrational number, then $a + br$ is irrational

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$\forall r, s \in \mathbb{R}$, if r and s are rational, then $r - s$ is rational. 2)

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3) Prove the following, using the rules of inference:

$[(p \Rightarrow (q \Rightarrow r)) \wedge (p \vee s) \wedge (t \Rightarrow q) \wedge \neg s] \Rightarrow [\neg r \Rightarrow \neg t]$

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4) Prove or disprove: If m, n are positive integers and m, n are perfect squares, then m + n is a perfect square.

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5) if we have :

$p : n^2$ is odd

$q : 1 - n$ is even

$s : n^2 + 1$ is even

Then show that :

$q \leftrightarrow p$

$q \leftrightarrow s$
