Math 311
Presentation Problems

The following problems have been compiled to both aid you in preparing for the final exam and to serve as a list of presentation eligible problems during our last regular class meeting on Tuesday, December 8th. You are expected to give a clear and correct proof, and to be able to talk your classmates through your argument as you are presenting it on the board.

1. Prove that there **do not** exist integers m and n such that $2m + 4n = 7$.
2. **Prove or Disprove:** Let a, b, and c be integers. If ab divides c, then a divides c.
3. Prove that for integers $n > 1$ that $n!$ is even.
4. **Prove or Disprove:** The product of any 3 consecutive integers is a multiple of 3.
5. **Prove or Disprove:** If A or B are sets satisfying $A \cup B = A \cap B$, then $A \cap \overline{B} = \emptyset$.
6. Suppose $R = \{(x, y) \in \mathbb{R}^2 \, : y - x \text{ is an integer } \}$. Prove that R is an equivalence relation.
7. Prove that if r^2 is irrational, then r is also irrational.
8. Describe all real numbers such that $\lceil x + y \rceil = \lceil x \rceil + \lceil y \rceil$

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