

Practice Exam 3

1. Prove or disprove the following theorem.

Theorem 1. *For every natural number n , the integer $n^2 + 17n + 17$ is prime.*

1. Written Solution

2. Prove or disprove the following theorem.

Theorem 2. $\{13x + 10y : x, y \in \mathbb{Z}\} = \mathbb{Z}$.

1. Written Solution

2. Video Solution

3. Prove the following Theorem.

Theorem 3. *Prove that for all $n \in \mathbb{N}$, $\sum_{i=1}^n 2^i = 2^{n+1} - 2$.*

1. Written Solution

2. Video Solution

4. Define a relation $R = \{(x, y) \in \mathbb{R} \times \mathbb{R} : x - y \in \mathbb{Z}\}$. Prove that R is an equivalence relation. Find the partition of \mathbb{R} created by the equivalence classes.

1. Written Solution

2. Video solution at

5. Let $f : \mathbb{Z} \times \mathbb{Z} \rightarrow \mathbb{Z} \times \mathbb{Z}$ defined by $f(m, n) = (5m + 4n, 4m + 3n)$. Is f a function? Is it one-to-one? Is it onto?

1. Written Solution

2. Video Solution