Reproducing a LaTeXdocument # 2

"Your name here"

Theorem 1. *The set* $\{x \in \mathbb{Z} : |x - 2.5| = 2\}$ *is the empty set.*

Proof. Let y be an integer such that $y \in \{x \in \mathbb{Z} : |x - 2.5| = 2\}$ Then $y \in \mathbb{Z}$ and $|y - 2.5| = 2$. Since $|y - 2.5| = 2$ then $y = 4.5$ or $y = -.5$. But then y is not an integer. Therefore the set $\{x \in \mathbb{Z} : |x - 2.5| = 2\}$ has no elements and

$$\{x \in \mathbb{Z} : |x - 2.5| = 2\} = \emptyset.$$

□

Theorem 2. *There exist two positive irrational numbers* s *and* t *such that* s^t *is rational.*

Proof. We will consider two cases. For the first case, suppose that $\sqrt{2}^{\sqrt{2}}$ is rational. Then we may take $s = t = \sqrt{2}$. For the second case, suppose that $\sqrt{2}^{\sqrt{2}}$ is irrational. Let $s = \sqrt{2}^{\sqrt{2}}$ and $t = \sqrt{2}$. Then

$$\left(\sqrt{2}^{\sqrt{2}}\right)^{\sqrt{2}} = \left(\sqrt{2}\right)^2 = 2.$$

Since 2 is rational, s^t is rational. Therefore, there exists irrational numbers s and t such that s^t is rational. □

Theorem 3. *Let* n *be a natural number. Then*

$$\sum_{k=1}^{n} k = \frac{n(n+1)}{2}.$$

Consider the following matrix,

$$\begin{pmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{pmatrix}$$