Your first \LaTeX assignment is to use \LaTeX to produce a document that replicates this one as exactly as possible, with just two differences: First, replace the class section number, date, and names above with your own. Second, make the following letter substitutions so that I know that you did not just photocopy this document: in the first two proofs, change each \( m \) to \( n \); in the last proof, change each \( c \) to \( b \). Your grade on this assignment will be based on how much your paper looks like this one.

**Problem:**
Prove that every integer that is divisible by 6 is even.

**Solution:**

\begin{proof}
Suppose \( m \in \mathbb{Z} \) is divisible by 6. Then there is some \( k \in \mathbb{Z} \) such that \( m = 6k \). Therefore \( m = 2(3k) \), and since \( 3k \) is also in \( \mathbb{Z} \), this means that \( m \) is divisible by 2 and therefore that \( m \) is even. \hfill \Box
\end{proof}

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**Problem:**
Define \( A = \{ m \in \mathbb{Z} \mid m^3 - m^2 - 6m = 0 \} \). Prove that if \( m \in A \) then \( m = -2, 0, \) or \( 3 \).

**Solution:**

\begin{proof}
Let \( A = \{ m \in \mathbb{Z} \mid m^3 - m^2 - 6m = 0 \} \). Note that

\[
 m^3 - m^2 - 6m = m(m^2 - m - 6) = m(m + 2)(m - 3).
\]

(factor out an \( m \))

Therefore if \( m \in A \) then \( m(m + 2)(m - 3) = 0 \), which means that \( m \) must be equal to one of \(-2, 0, \) or \( 3 \). \hfill \Box
\end{proof}

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**Problem:**
Prove that if \( a, c \in \mathbb{R} \) with \( a \leq c \) then \( [c, \infty) \subseteq [a, \infty) \).

**Solution:**

\begin{proof}
Suppose \( a \leq c \) in \( \mathbb{R} \). For all \( x \in \mathbb{R} \),

\[
 x \in [c, \infty) \implies x \geq c
\]

\[
 \implies x \geq c \geq a \quad (c \geq a \text{ by hypothesis})
\]

\[
 \implies x \geq a \quad (\text{transitivity})
\]

\[
 \implies x \in [a, \infty).
\]

Therefore we have \( [c, \infty) \subseteq [a, \infty) \). \hfill \Box
\end{proof}