Due in class Friday, March 18. Make sure to copy the proposition for each proof and then clearly indicate where your proof starts and ends.

Prove the following statements.

1. Suppose $a \in \mathbb{Z}$. Then $a^2 \mid a$ if and only if $a \in \{-1, 0, 1\}$.

2. There exists a set X such that $\mathbb{Z} \subset X$ and $\mathbb{Z} \in X$.

3. Let $a, b, c \in \mathbb{Z}$. If $a \mid bc$ and $\gcd(a, b) = 1$, then $a \mid c$. Hint: Use the theorem we proved in class that if $\gcd(a, b) = 1$, then there exists $x, y \in \mathbb{Z}$ such that $xa + yb = 1$.