1. Rewrite the following theorem using “if then” notation. 
   Theorem: The union of two countable sets is countable.
   Theorem: If \( \text{then} \)

2. Finish this statement. A set \( S \) is countable infinite if

3. For each of the following sets, decide if the set is countable or uncountable.
   a. The odd natural numbers. Countable \hspace{1cm} \text{Uncountable}
   b. The open interval \((0, 1)\). Countable \hspace{1cm} \text{Uncountable}
   c. The rational numbers \( \mathbb{Q} \). Countable \hspace{1cm} \text{Uncountable}
   d. \( R^+ = \{ x \in R | x \geq 0 \} \). Countable \hspace{1cm} \text{Uncountable}
   e. \( N \times \mathbb{Q} = \{(a, b) : a \in N \text{ and } b \in \mathbb{Q}\} \). Countable \hspace{1cm} \text{Uncountable}
   f. \( \{ z \in \mathbb{Z} : -3 \leq z < 5 \} \). Countable \hspace{1cm} \text{Uncountable}

4. Prove that the following set is countable. \( S = \{ \ldots, -20, -15, -10, -5, 0, 5, 10, 15, 20, \ldots \} \).

5. Make a sketch of the set \([1, 3] \times N = \{(x, n) : 1 \leq x \leq 3, n \in N\} \).