1. Consider the following statement:

   If \( m \) and \( n \) are odd integers, then \( mn \) is an odd integer.

   (a) Express the statement using logical notation.

   \[
   \text{a) } (\exists m \in \mathbb{Z})(\exists n \in \mathbb{Z})(m \text{ odd } \land n \text{ odd } \implies mn \text{ odd})
   \]

   (b) This statement can be proven using a direct proof. Write a detailed proof structure for the statement. **Don’t write a complete proof** — for now, focus on the proof structure only and leave out all of the “middle” of the argument.

   (c) Now, complete the proof of the statement.
2. Consider the following statement:

If \( m \) and \( n \) are integers with \( mn \) odd, then \( m \) and \( n \) are odd.

(a) Express the statement using logical notation.

(b) This statement can be proven using an indirect proof. Write a detailed proof structure for the statement. **Don't write a complete proof** — for now, focus on the proof structure only and leave out all of the “middle” of the argument.

(c) Now, complete the proof of the statement.