

1. Show that $\neg p \rightarrow (q \rightarrow r)$ and $q \rightarrow (p \vee r)$ are logically equivalent.
2. Let $P(x)$ be “ x can speak English.” and $Q(x)$ be “ x knows C++.”, where the universe of discourse is the set of all students in our class. Use quantifiers to express the following statements.
 - (a) There is a student in our class who can speak English but does not know C++.
 - (b) Every student in our class speaks English.
 - (c) Every one that knows C++ in our class can speak English.
3. The following four cards sit on a table:



Each card has a digit on one side and a letter on the other side. Which cards should you turn around to test the following statement: “whenever there is a vowel on one side of a card, there is an even digit on the other side”? (In English, vowels are letters A, E, I, O, U.)