

Course works-1-

<p>Negations</p> <p>A negation is symbolized by placing this symbol ‘\neg’ before the sentence-letter. The negation symbol is used to translate these English phrases:</p> <ul style="list-style-type: none">• not• it is not the case that• it is not true that• it is false that	<p>Disjunction</p> <p>A disjunction is an “or” sentence. It claims that at least one of two sentences, is true.</p> <p>We use this symbol, called a “vel,” for disjunctions: \vee The vel is used to translate - or – either-or</p>
<p>Conjunction</p> <p>“and” sentences. They put two sentences, called conjuncts, together and claim that they are both true.</p> <p>The English words that are translated with the ampersand include:</p> <ul style="list-style-type: none">• and• but• also• however• yet• still• moreover• although• nevertheless• both	<p>Conditional(implies)</p> <p>The conditional is a common type of sentence. It claims that something is true, if something else is also.</p> <p>The arrow translates many English words and phrases, including</p> <ul style="list-style-type: none">• if• if... then• only if• whenever• when• only when• implies• provided that• means• is a sufficient condition for• is a necessary condition for• on the condition that• in case
<p>Biconditional</p> <p>There are times when something is both a necessary and a sufficient condition for something else.</p> <p>Here are some English phrases that signify biconditionals:</p> <ul style="list-style-type: none">• it and only if• when and only when• just in case• is a necessary and sufficient condition for	

T: Ali hit the ball.

J: John caught the ball.

S: Snoopy chased the ball.

English Sentence	Translation
Ali did not hit the ball	
Either Ali hit the ball or John caught the ball	
Snoopy chased the ball, but John caught it.	
If John caught the ball, then Snoopy did not chase it.	
Snoopy chased the ball if and only if Ali hit the ball.	

Let p and q be the propositions

p : It is below freezing.

q : It is snowing.

Write these propositions using p and q and logical connectives (including negations).

- A. It is below freezing and snowing.
- B. It is below freezing but not snowing.
- C. It is not below freezing and it is not snowing.
- D. It is either snowing or below freezing (or both).
- E. If it is below freezing, it is also snowing.
- F. Either it is below freezing or it is snowing, but it is not snowing if it is below freezing.
- G. That it is below freezing is necessary and sufficient for it to be snowing.