Lecture Examples

Ex 1 Consider the following statements

p: I ran 3 miles this morning

q: You ran 3 miles this morning

(a) Give a symbolic representation of the following (natural language) sentences:

    i. "You did not run 3 miles this morning."

    ii. "I did not run 3 miles this morning, but you ran 3 miles this morning."

    iii. "It is not the case that both you and I ran 3 miles this morning."

(b) Give a natural language interpretation of the following symbolic sentences:

    i. $p \wedge q$

    ii. $p \wedge (\sim q)$

Ex 2 Consider the following sentences

p: My friend from Connecticut visited me.

q: I went to Saddle Mountain.

r: It rained last week.

(a) Translate the following natural language sentences into symbolic statements:

    i. "Either it rained last week or I went to Saddle Mountain."

    ii. "If my friend from Connecticut visited me, then I didn't go to Saddle Mountain."

    iii. "If I went to Saddle Mountain and my friend visited me, then it rained last week."

(b) Give a natural language interpretation of the following symbolic statements:

    i. $p \vee (\sim r)$

    ii. $(\sim p) \rightarrow r$

    iii. $p \wedge ((\sim r) \rightarrow q)$

On-Your-Own Examples

Ex 1 Write a sentence that represents the negation of each statement.

    (a) All children eat candy.

    (b) Some students are vegetarian.

    (c) Some students do not play sports.

    (d) No students play instruments.

Ex 2 Using the following symbolic representations
                p: The car costs \$70,000
                q: The car goes 140 mph
                r: The car is red
   express the following compound statements in symbolic form.

    (a) All red cars go 140 mph.

    (b) The car is red, goes 140 mph, and does not cost \$70,000.

    (c) If the car does not cost \$70,000, it does not go 140 mph.

    (d) The car is red and it neither goes 140 mph nor costs \$70,000.

    (e) Being able to go 140 mph is sufficient for a car to cost \$70,000 or be red.

    (f) Not being red is necessary for a car to cost \$70,000 and not go 140 mph.

Ex 3 True or False?

    (a) Having a lottery ticket is sufficient for winning the lottery.

    (b) Having a lottery ticket is necessary for winning the lottery.

Ex 4 Using the symbolic representations
p: It is raining.
q: The sun is shining.
r: It is warm.

express the following in words.

    (a) $p \wedge q$

    (b) $p \wedge \sim q$

    (c) $p \rightarrow (\sim q \wedge \sim r)$

    (d) $r \rightarrow (\sim p \vee q)$

Ex 5 Translate each sentence into symbolic form. Be sure to define each letter you use.

    (a) Joyce will go to the movies or visit a friend.

    (b) Snow is sufficient for the game to be canceled.

    (c) All right triangles are isosceles.

    (d) If Eric and Simon go on vacation, then Jesse will stay home.

    (e) If the label does not read "poison" then it is safe to drink.

    (f) I will not go out or I will wear a raincoat if it rains.