Read each of the following pair of "premises" and write a logical conclusion. Then use the identifiers to translate each paragraph into symbols.

\[ \text{p: The sun is shining} \quad \text{q: We will go to the beach} \]
\[ \text{r: We will get wet} \quad \text{s: We will go on a picnic} \]

**Translation into Symbols**

1. \( A: \) IF THE SUN IS SHINING THEN WE WILL GO TO THE BEACH.
   \( B: \) THE SUN IS SHINING.
   THEREFORE,

2. \( A: \) IF THE SUN IS SHINING THEN WE WILL GO TO THE BEACH
   \( B: \) WE DO NOT GO TO THE BEACH.
   THEREFORE,

3. \( A: \) IF THE SUN IS SHINING THEN WE WILL GO TO THE BEACH.
   \( B: \) IF WE GO TO THE BEACH THEN WE WILL GET WET.
   THEREFORE, IF THE SUN IS SHINING THEN

4a. \( A: \) WE WILL GO ON A PICNIC OR WE WILL GO TO THE BEACH.
    \( B: \) WE DO NOT GO ON A PICNIC.
    THEREFORE,

4b. \( A: \) WE WILL GO ON A PICNIC OR WE WILL GO TO THE BEACH.
    \( B: \) WE DO NOT GO TO THE BEACH.
    THEREFORE,

The four patterns you identified above are known as the four basic logical reasoning patterns. Their official names are:

1. Law of Detachment - The conditional
2. Law of Contraposition - The contrapositive
3. Law of Syllogism - The transitive
4a and b. Disjunctive syllogism - The disjunction

Given each pair of statements, translate the premises into symbols and try to write a "logical" conclusion.

5. \( A: \) IF THE SUN IS SHINING THEN WE WILL GO TO THE BEACH.
   \( B: \) THE SUN IS NOT SHINING.
   THEREFORE,

6. \( A: \) IF THE SUN IS SHINING THEN WE WILL GO TO THE BEACH.
   \( B: \) WE GO TO THE BEACH.
   THEREFORE,

These translations represent the two INVALID reasoning patterns, known as FALLACIES.

5. Fallacy of the Inverse
6. Fallacy of the Converse
Practice: Match the example with the correct valid reasoning pattern:

1. If it rains, then he will stay at home.
   He did not stay at home.
   Therefore, it did not rain.

2. If it rains, he will stay at home.
   It rains.
   Therefore he stays at home.

3. If it rains, he will stay at home.
   If he stays at home, he will watch a video tape.
   Therefore, if it rains, he will watch a video tape.

4. He will play tennis or swim.
   He did not swim
   Therefore, he plays tennis.

a) \( p \rightarrow q \)

b) \( p \lor q \)

c) \( p \rightarrow q \)

d) \( p \rightarrow q \)

q \( \rightarrow r \)

\(~q\)

p

\( \therefore p \rightarrow r \)

\( \therefore q \)

\( \therefore \sim p \)

CLAST: Select the conclusion that will make the following arguments valid.

5. If she goes to the dentist, then the dentist will take x-rays. If the dentist takes x-rays, then he may find some cavities.
   a. If the dentist finds some cavities, then he made x-rays.
   b. If the dentist finds some cavities, then she went to the dentist.
   c. If she does not go to the dentist, then the dentist may not find her cavities.
   d. If she goes to the dentist, then dentist may find some cavities.

6. He is going to read the newspaper or watch television. He does not watch television.
   a. He does not read the newspaper.
   b. He does not read the newspaper and he does not watch TV.
   c. He reads the newspaper.
   d. If he reads the newspaper, then he will watch TV.

7. If he goes to the mall, then he will stop at the ice cram shop for a frozen yogurt. He goes to the mall.
   a. He stops at the ice cram shop for a frozen yogurt.
   b. He stops at the ice cream shop, but does not get a frozen yogurt.
   c. He will go to the mall or stop at the ice cream shop for a frozen yogurt.
   d. None of the above.

8. If I go to the beach, then I will swim in the ocean. If I swim in the ocean, I will feel refreshed.
   a. If I do not go to the beach, then I will not feel refreshed.
   b. If I do not feel refreshed, then I did not go to the beach.
   c. If I swim, then I went to the beach.
   d. If I go to the beach, then I will feel refreshed.

9. If all students study, then no make up tests will be needed. Some make up tests are needed.
   a. Some students study.
   b. If there are no make up tests, then all students study.
   c. All students study.
   d. Some students did not study.

10. If I go to the party then I will buy a new dress. I bought a new dress.
    a. I went to the party.
    b. I did not go to the party.
    c. I did not buy a new dress.
    d. None of the above.

11. The television is on or the plug is not plugged in. The plug is plugged in.
    a. The television is on
    b. The television is not on
    c. The plug is not plugged in.
    d. None of the above.
HW: Section 3.5 Problems 33, 35, 39, 45, 47, 51 and the following worksheet:

Section 3.5 – Logical Reasoning Patterns – Homework Worksheet

Identify the pattern as valid or invalid. Hint – it may help to translate the examples into symbols.

1. If the weather is bad, then the party is canceled.
   The weather is bad.
   ∴ The party is canceled.

2. If the weather is nice, then we will go on a picnic.
   We will go on a picnic.
   ∴ The weather is nice.

3. I am a teacher or I am a preacher.
   I am not a preacher.
   ∴ I am a teacher.

4. If the painting is a Picasso, then it is not a Rembrandt.
   The painting is a Rembrandt.
   ∴ The painting is not a Picasso.

5. If you study, then you will pass the tests.
   If you pass the tests, then you will pass the course.
   ∴ If you study, then you will pass the course.

6. If you go in the water, then I will go in the water.
   You do not go in the water.
   ∴ I will not go in the water.

For each of the following arguments supply a valid conclusion.

7. If you like math then you like English.
   If you like English then you like science.
   Therefore............

8. You like math or you like English.
   You do not like English.
   Therefore.............

9. If you like math then you like English.
   You do not like English.
   Therefore.............

10. If you like math then you like English.
    You like math.
    Therefore.............