Problem 1: Write the symbolic forms for the following forms of the conditional \( p \rightarrow q \). [10 pts]

1. Contrapositive:
2. Inverse:
3. Converse:

Problem 2: Given the following statements, write the three variations of the conditional \( p \rightarrow q \) in sentence form. [20 pts]

\( p \) : She is a police officer.
\( q \) : She carries a gun.

1. Conditional: If she is a police officer, then she carries a gun.
2. Converse:
3. Inverse:
4. Contrapositive:

Problem 3: Construct a truth table for the symbolic expression \( \sim p \lor \sim (q \land r) \). Include as many columns as necessary. [25 pts]
Problem 4: Construct a truth table to determine whether the statements in the pair are equivalent. Include as many columns as necessary. [25 pts]

If I drink decaffeinated coffee, then I do not stay awake.

If I do stay awake, then I do not drink decaffeinated coffee.

Label the statements accordingly:

\[ p : \text{I drink decaffeinated coffee.} \]
\[ q : \text{I stay awake.} \]

Problem 5: Determine which pairs of statements are equivalent? (possibly more than one pair) [10 pts]

1. If the Giants win, then I am happy.
2. If I am happy, then the Giants win.
3. If the Giants lose, then I am unhappy.
4. If I am unhappy, then the Giants lose.

The following are equivalent:________________________

Problem 6: Express the given biconditional as the conjunction of two conditionals: [10 pts]

We eat at Burger World if and only if Ju Ju’s Kitsch-Inn is closed.

\[ p \rightarrow q : \]
\[ q \rightarrow p : \]