1. Determine whether each of the following is a **statement**, a **predicate**, or neither. If possible, determine whether each of the **statements** is True or False.
   (a) $\sqrt{2} > 1$
   (b) $\sin^2 x + \cos^2 x = 1$
   (c) When is the square of a number greater than one?
   (d) Get some rest.
   (e) a is an even number.
   (f) $\forall x \in \mathbf{R}, (x^2 > 3 \rightarrow x > 1)$
2. Give the **converse, inverse, contrapositive**, and (non-trivial!) **negation** of the following statements.
   (a) $\sim p \rightarrow r$
3. Find an equivalent statement that contains only $\vee$ or $\wedge$:
$$\sim ((p \vee q) \rightarrow (p \wedge q))$$
4. Convert the following binary number to hexadecimal (base-16): 1101001110011010
5. Convert the following base-5 number to decimal: 1234
6. For the following table,
   (a) construct a Boolean expression having the table as its truth table
   (b) design a circuit having the table as its input/output table

P	Q	R	S
1	1	1	0
1	1	0	0
1	0	1	1
1	0	0	0
0	1	1	1
0	1	0	0
0	0	1	0
0	0	0	0

7. Rewrite the following statements formally (using quantifiers and variables):
   (a) Some integers are not necessarily the product of two prime numbers.
8. Write the non-trivial **negation** of the following statements:
   (a) There exist a real number x such that for all real numbers y, $xy > y$.
   (b) $\forall n \in \mathbf{Z}, (n \text{ even} \rightarrow n + 1 \text{ odd})$.