Excercise

1.

p	q	$\neg p$	$\neg q$	$p \to q$	$q \to p$	$p \to \neg q$	$\neg q \to \neg p$
T	T						
T	F						
F	T						
F	F						

2. p = "I bought a lottery this week." q = "I won a bonus of one million dollars on Friday."
 Express the following propositions in daily language.

a. $\neg p$ b. $p \vee q$ c. $\neg p \wedge q$ d. $p \wedge q$

e. $p \leftrightarrow q$ f. $\neg p \to \neg q$ g. $\neg p \wedge \neg q$ h. $\neg p \vee (p \wedge \neg q)$

3. Please write down the results of executing the following operator between the two bit strings: 01 1011 0110 and 11 0001 1101. a. bitwise OR b. bitwise AND c. bitwise XOR

4. *p*: Grizzly bears have been seen in the area.

   q: Hiking is safe on the trail.

   r: Berries are ripe along the trail.

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

a) Berries are ripe along the trail, but grizzly bears have not been seen in the area.

b) Grizzly bears have not been seen in the area and hiking on the trail is safe, but berries are ripe along the trail.

c) If berries are ripe along the trail, hiking is safe if and only if grizzly bears have not been seen in the area.

d) It is not safe to hike on the trail, but grizzly bears have not been seen in the area and the berries along the trail are ripe.

e) For hiking on the trail to be safe, it is necessary but not sufficient that berries not be ripe along the trail and for grizzly bears not to have been seen in the area.

f) Hiking is not safe on the trail whenever grizzly bears have been seen in the area and berries are ripe along the trail.

Exercise -Answers

1.

p	q	$\neg p$	$\neg q$	$p \rightarrow q$	$q \rightarrow p$	$p \rightarrow \neg q$	$\neg q \rightarrow \neg p$
T	T	F	F	T	T	F	T
T	F	F	T	F	T	T	F
F	T	T	F	T	F	T	T
F	F	T	T	T	T	T	T

2.
 a) I did not buy a lottery this week
 b) I bought a lottery this week or I won a bonus of one million dollars on Friday.
 c) I did not buy a lottery this week and I won a bonus of one million dollars on Friday.
 d) I bought a lottery this week and I won a bonus of one million dollars on Friday.
 e) I bought a lottery this week if and only if I won a bonus of one million dollars on Friday.
 f) If I did not buy a lottery this week then I would not win a bonus of one million dollars on Friday.
 g) I did not buy a lottery this week and I would not win a bonus of one million dollars on Friday.
 h) Neither I did not buy a lottery this week or I bought a lottery this week and
I did not win a bonus of one million dollars on Friday.

Exercise -Answers

3.

a) OR: 11 1011 1111

b) AND: 01 0001 0100

c) XOR: 10 1010 1011

4.

a) $r \wedge \neg p$

b) $\neg p \wedge q \wedge r$

c) $(r \rightarrow q) \leftrightarrow \neg p$

d) $\neg q \wedge \neg p \wedge r$

e) $(q \rightarrow (\neg r \wedge \neg p) \wedge \neg((\neg r \wedge \neg p) \rightarrow q)$

f) $p \wedge r \rightarrow \neg q$