

## Homework – 01

Topic: Compound Propositions using  $\neg$ ,  $\wedge$ ,  $\vee$ ,  $\oplus$

1. Develop truth tables for the following compound propositions.
  - a)  $(p \wedge q) \vee (\neg p \vee (p \wedge \neg q)) \vee r$
  - b)  $(p \wedge \neg q) \wedge (\neg p \vee q) \wedge r$
  - c)  $((\neg p \wedge q) \wedge (q \vee r)) \wedge \neg q \wedge r$
2. Let  $h$ : "Amir is handsome",  $c$ : "Amir is clever",  $p$ : "Amir is optimistic". Rewrite the following in symbolic forms using  $\neg$ ,  $\wedge$ ,  $\vee$  and  $\oplus$ . You should not simplify the compound propositions.
  - a) Amir is handsome and clever but not optimistic.
  - b) Amir is either clever or handsome or both.
  - c) Amir is either clever or handsome but not both.
  - d) Amir is neither handsome, nor clever nor optimistic.
  - e) Amir is not both handsome and clever, but he is optimistic.
  - f) Amir is optimistic but not clever nor handsome.
3. Let  $p$ ,  $q$ , and  $r$  be the propositions:  
 $p$ : You get an A on the final exam.  
 $q$ : You do every exercise in this book.  
 $r$ : You get an A in this class.  
  
Express the following in symbolic form:
  - a) You get an A in this class, but you do not do every exercise in this book.
  - b) You get an A on the final, you do every exercise in this book, and you get an A in this class.
  - c) You get an A on the final, but you don't do every exercise in this book; nevertheless, you get an A in this class.
4. Consider the simple propositions:  $r$ : Roses are red,  $b$ : Violets are blue and  $s$ : Sugar is sweet. Translate the following statements into intelligible English.
  - a)  $b \vee \neg s$
  - b)  $r \vee (b \wedge \neg s)$
  - c)  $(r \vee b) \wedge \neg s$
5. Consider the proposition labels:  $f$ : food is good,  $s$ : service is excellent,  $p$ : price is high. Translate each of the following compound statements into symbolic notation.
  - a) The food is good but the service is not excellent.
  - b) The food is good and the service is excellent, but the price is high.
  - c) Neither the food is good nor is the service excellent.