TUTORIAL4: LOGIC

1. Give a negation for each statement below:
    a) $2 + 7 \leq 11$
    b) 2 is an even integer and 7 is an odd integer.
    c) If you drive, I will walk.

2. Identify either it is true or false:
    a) $2 < 3$ or 3 is a positive integer
    b) $2 \geq 3$ or 3 is a positive integer
    c) $2 < 3$ or 3 is not a positive integer
    d) $2 \geq 3$ or 3 is not a positive integer
    e) $2 < 3$ and 3 is a positive integer
    f) $2 \geq 3$ and 3 is a positive integer
    g) $2 < 3$ and 3 is not a positive integer
    h) $2 \geq 3$ and 3 is not a positive integer

3. Let say p: Ali rich, q: Ali happy. Write sentences below into symbols.
(**but** is represented by AND)
    a) Ali poor but happy.
    b) Ali not rich and not happy.
    c) Ali either rich or happy.
    d) Ali either poor or Ali rich and not happy.
    e) If Ali rich, then Ali is not happy.
    f) Ali is poor if only Ali is happy

4. Let say *p*: Edi read BH, *q*: Edi read Utusan, *r*: Edi read NST. Write into symbols:
    a) Edi read BH or Utusan, but not NST
    b) Edi read BH and Utusan, or he do not read BH and NST
    c) It is not true that Edi read BH but not NST
    d) It is not true that Edi read NST or Utusan but not BH

5. Negate all statements in question number 4.

6. Build a truth table for each statement below:

a) $(\sim p \wedge r) \vee p$ b) $(p \vee q) \vee \sim q$ c) $(p \vee q) \wedge r$

d) $(\sim p \vee q) \wedge \sim r$ e) $p \rightarrow (q \vee r)$ f) $(p \vee r) \rightarrow \sim q$

7. Determine whether statements **$\sim(p \wedge q)$** and **$\sim p \vee \sim q$** are logically equivalent.

8. What is it mean by tautology and contradiction?

9. Determine whether statements **$(p \vee q) \wedge r$** and **$(p \vee r) \rightarrow \sim q$** are logically equivalent.

10. Identify the truth value for each statement below:

a) $\forall x, |x| = x$ b) $\exists x, x^2 = x$ c) $\forall x, x + 1 > x$ d) $\exists x, x + 2 = x$

e) $\forall x, x^2 = x$ f) $\exists x, 2x = x$ g) $\forall x, x - 3 < x$ h) $\exists x, (x - 2)^2 = 0$

11. Let A = {1, 2, 3, 4, 5}. Identify the truth value for each statement below.

a) $(\exists x \in A)(x + 3 = 10)$ b) $(\forall x \in A)(x + 3 < 10)$

c) $(\exists x \in A)(x + 3 < 5)$ d) $(\forall x \in A)(x + 3 \leq 7)$

e) $(\forall x \in A)(x + 3 < 6)$ f) $(\exists x \in A)(x + 3 < 6)$

g) $(\exists x \in A)(2x^2 + x = 15)$