Exercises (1) Discrete Mathematical

(1) Which of these sentences are proposition? What are the truth values of those that are Propositions ?

(a) London is the capital of France. (b) What time is it ? (c) Read this carefully

(d) $x+1=2$ (e) $2+2=3$ (f) Answer this question.

(2) Let P, q and r be the propositions:

P : you have the flu , q: you miss the final examination , r : you pass the course

Express each of these propositions as an English sentence.

(a) $(P \wedge q) \vee (\neg q \wedge r)$ (b) $(P \rightarrow q)$ (c) $q \rightarrow \neg r$

(3) Determine whether these biconditionals are true or false :

(a) $2+2=4$ *if and only if* $1+1=2$

(b) $0>1$ *if and only if* $2>1$

(c) $1+1=3$ *if and only if* monkeys can fly

(4) Determine whether each of these conditional statements is true or false :

(a) *if* $1+1=2$ *then* $2+2=5$ (b) *if* $1+1=3$ *then* $2+2=4$

(c) if monkeys can fly , then $1+1=3$

(5) Construct a truth table for each of these compound propositions :

(a) $(p \vee q) \oplus (p \wedge q)$ (b) $p \oplus \neg p$ (c) $(p \rightarrow q) \vee (\neg p \rightarrow q)$

Exercise : 2 Discrete Mathematical

(1) Use truth table to verify these equivalences :

(a) $p \to q \equiv \neg q \to \neg p$ (b) $p \wedge (q \vee r) \equiv (p \wedge q) \vee (p \wedge r)$

(c) $\neg(p \oplus q) \equiv p \leftrightarrow q$ (d) $\neg(p \leftrightarrow q) \equiv p \leftrightarrow \neg q$

(2) Show that each of these conditional statements a tautology by using truth tables :

(a) $(p \wedge q) \to (p \to q)$ (b) $\neg(p \to q) \to \neg q$ (c) $\neg p \to (p \to q)$

(3) Determine whether $(p \wedge q) \to (p \vee q)$ is a tautology by using logic laws

(4) Show that the statements :

(a) $(p \to r) \vee (q \to r) \equiv (p \wedge q) \to r$ (b) $\neg(p \vee (\neg p \wedge q)) \equiv \neg p \wedge \neg q$

by using logic laws

(5) Use a direct proof to show that the sum of two odd integers is even

(6) Given an indirect contrapositive proof of $if\ n = ab\ then\ a \leq \sqrt{n}\ or\ b \leq \sqrt{n}\ , \forall a, b \in$

(7) Given an indirect contradiction proof of $\sqrt{7}$ is irrational number