

MIDTERM REVIEW OF DISCRETE STRUCTURES

Lưu ý: Hệ CLC và CLC (Eng) thi đề tiếng Anh; Hệ tiêu chuẩn thi đề tiếng Việt.

1/ Given statements p and q:

p: “You get A for the exam”

q: “You solve all the exercises in this book”

Rewrite these following statements using p, q and logical connectives.

a/ You get A for the exam but you did not solve all the exercises in this book.

b/ If you solve all the exercises in this book, then you will get A for the exam.

2/ Give the converse and contrapositive of these conditional statements:

a/ If you solve all the exercises in this book, then you will get A for the exam.

b/ If you do not go to school today, you will be banned from the exam.

c/ I will go to the beach in any hot day.

3/ Rewrite the following statements in natural language using “p if and only if q” form:

a/ A necessary and sufficient condition for graduation is that you have to study.

b/ If you go to school, you’ll get your attendance, and if you took your attendance, you had gone to school.

4/ Rewrite the following statements in natural language using “if p then q” form:

a/ Being over 18 is sufficient to become the US president

b/ You need to study all the lessons to pass the Discrete Structures module.

5/ Using truth table to prove that the following statements are tautology:

a/ $(p \wedge q) \rightarrow p$

b/ $[(p \rightarrow q) \wedge (q \rightarrow r)] \rightarrow (p \rightarrow r)$

6/ Prove the statements in question 5 are tautology using logical equivalence laws.

7/ Prove this argument:












$p \rightarrow q$
 $q \rightarrow r$
 $\neg r$
 $s \vee p$
 $s \rightarrow t$

 $\therefore t$

8/ Let $F(x,y)$ be the sentence “x can cheat y”, in which the domain of x and y is everyone in the world. Using quantifiers to represent the following statements:

- a/ Everyone can cheat An.
- b/ Everyone can cheat someone.
- c/ Nam can cheat only two persons.

9/ Given this Tarski's world.

Let the common domain D of all variables be the set of all the objects in the Tarski's world.

Triangle(x): “x is a triangle”

Circle(x): “x is a circle”

Square(x): “x is a square”

Blue(x): “x is blue”

Gray(x): “x is gray”

Black(x): “x is black”

RightOf(x,y): “x is to the right of y (but possibly in a different row)”

Above(x,y): “x is above y (but possibly in a different column)”

SameColorAs(x,y): “x has the same color as y”

Determine the truth or falsity of each of the following statements. Give reasons for your answers.

- a. $\forall u, \text{Circle}(u) \rightarrow \text{Gray}(u)$.
- b. $\exists y$ such that $\text{Square}(y) \wedge \text{Above}(y, d)$.
- c. For all circles x there is a square y such that x and y have the same color.
- d. There is a triangle x such that for all squares y, x is above y.
- e. \forall circles x and \forall squares y, x is above y.
- f. \exists a circle x and \exists a square y such that x is above y and x and y have different colors.

The end.