

## CS 381 Test 1

February 19, 2003

1. Convert the following statements to **if\_then form** in English:
  - (a) Few people can solve difficult problems.
  - (b) Healthy diet is necessary for healthy body.
  - (c) Further technological advances are possible only if there are free discussions.
  - (d) You can not cash a check which is void. [20]
  
2. Negate the following statements in English. Give a form other than simply putting "not" or "it is not the case that" in front:
  - (a) If today is Tuesday then I have a test in Computer Science or in Biology.
  - (b) Everyone visited some room in this building.
  - (c) Someone likes it but does not eat it.
  - (d) Tomorrow it is going to rain or snow. [20]
  
3. Find the converse **and** contrapositive of the following statement in English:
  - (a) If it is sunny, people are happy.
  - (b) Some people like mathematics only if it is fun for them. [20]
  
4. Find the dual of  $[True \wedge (P \vee \neg Q) \wedge \neg(Q \vee False)]$ . [5]
  
- 5 (a) Express the argument given below using the symbold suggested for each proposition. [8]
  - (b) Check whether or not the reasoning is correct using inference rules on the propositions in symbolic form. [12]

**Argument:**

If I like mathematics(L), then either I study it hard(H) or I enjoy studying it(E). If I enjoy studying mathematics, then I pass the mathematics course(P). If I study mathematics hard, then I don't like mathematics and if I enjoy studying mathematics then I study mathematics hard. But I like mathematics. Therefore I don't pass the mathematics course.

6. Fill in the blanks:

$$\begin{aligned} \text{(a)} \quad & \neg [ [ P \wedge Q ] \rightarrow P ] \Leftrightarrow [ P \wedge \boxed{?} ] \\ & \Leftrightarrow [ [ P \wedge \boxed{?} ] \wedge Q ] \Leftrightarrow [ \boxed{?} \wedge Q ] \\ & \Leftrightarrow \boxed{?} \end{aligned}$$

$$\begin{aligned} \text{(b)} \quad & [ P \wedge \neg [ \neg P \wedge Q ] ] \Leftrightarrow [ P \wedge [ \boxed{?} \vee \neg Q ] ] \\ & \Leftrightarrow [ [ P \vee \boxed{?} ] \wedge [ P \vee \neg Q ] ] \Leftrightarrow [ P \vee [ \boxed{?} \wedge \neg Q ] ] \\ & \Leftrightarrow [ P \vee \boxed{?} ] \Leftrightarrow P \end{aligned}$$

$$\text{(c)} \quad [ P \vee [ Q \wedge R ] ] \Leftrightarrow [ [ P \boxed{?} \boxed{?} ] \wedge [ P \vee R ] ]$$

[15]