

Name: _____ () Class: _____ Marks: _____

Department of Computing
Discrete Mathematics and Statistics
Assignment 1

Hand-out Date: 12 November, 2001.

Hand-in Date: 26 November, 2001.

You are warned to refrain from plagiarism. Both the plagiarist and the students whose work has been plagiarised will be penalized appropriately.
Answer ALL questions. All working must be clearly shown. Total mark is 50.

1. In a survey of 100 customers, the fast food restaurant found that 52 preferred hamburgers for their lunch, 61 preferred lunch boxes and 65 preferred noodles. In addition, 30 enjoyed hamburgers and noodles and 40 enjoyed lunch boxes and noodles. 10 customers enjoyed them all and 7 customers do not like any of them.

- (a) Construct a Venn diagram to present the data of the survey. [4]
 (b) How many customers enjoy hamburgers and noodles? [1]
 (c) How many customers prefer only hamburgers for their lunch? [1]

2. Use identities of sets, with explanations, to simplify the following set expression.

$$(A \cap \bar{B}) \cup (A \cap \bar{C}) \quad [6]$$

3. Decrypt the message "NAGUENK" that was encrypted by using

$$f(p) = (p + 13) \bmod 26 \quad [5]$$

4. By using MI, show that for every positive integer n ,

$$1 + 4 + 7 + \dots + (3n - 2) = \frac{3n^2 - n}{2} \quad [8]$$

5. Determine whether $p \rightarrow [q \vee \sim (p \rightarrow q)]$ is a tautology. [8]

6. (a) Convert the following argument to its symbolic form. [5]

If the IP address of the computer is correct, then the computer can access all workgroup computers within the local LAN.

If the settings of IP, DNS and Gateway Addresses are correct, then the computer can access Internet.

Now the computer can access all workgroup computers within the local LAN but cannot access Internet.

Therefore, either the DNS address or the Gateway address is incorrect.

(b) By using truth table, determine whether the argument in (a) is valid. [4]

7. Use proof by contradiction to prove that the product of a nonzero rational number and an irrational number is irrational. [8]

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