

# CS-603 Mathematical Concepts in Computer Science

Assignment-1(25-Aug-2009)

Department of Computer Science and Engineering, Indian Institute of Technology Madras.

1. (1 mark) Rewrite each proposition symbolically, when universe of discourse is a set of real numbers.
  - (a) For each integer  $x$ , there exists an integer  $y$  such that  $x + y = 0$ .
  - (b) There exists an integer  $x$  such that  $x + y = y$  for every integer  $y$
  - (c) For all integers  $x$  and  $y$ ,  $x.y = y.x$ .
  - (d) There are integers  $x$  and  $y$  such that  $x + y = 5$ .
  
2. (1 mark) A survey is taken on methods of commuter travel. Each respondent is asked to check BUS, TRAIN, AUTO as a major method of travelling to work. More than one answer is permitted. The results reported were as follows. How many respondents completed their surveys ?
  - 30 people checked BUS
  - 35 people checked TRAIN
  - 100 people checked AUTO
  - 15 people checked BUS and TRAIN
  - 15 people checked BUS and AUTO
  - 20 people checked TRAIN and AUTO
  - 5 people checked all three methods.
  
3. (2 marks) Show the validity of the argument. All lions are animals. Therefore, all heads of lions are heads of animals.
  
4. (1 mark) A, B, C, D, E are the only persons in a compartment of a train. A, C, E are men and B and D are women. The train passes through a tunnel. When the train emerged out of the tunnel, it is found that E is murdered. An enquiry is held. A, B, C, D make the following statements. Assume 4 of these 8 statements are true and 4 are false and that only one person is the murderer, who killed E?
  - A: I am innocent. B was talking to E when the train was passing through the tunnel.
  - B: I am innocent. I was not talking to E when the train was passing through the tunnel.
  - C: I am innocent. D murdered E
  - D: I am innocent. One of the men murdered E.