1. (20%) Design an algorithm that lists all the numbers that are between 1 and 100 and can only be divided by 1 or itself without leaving a remainder. Please use pseudocode to explain the algorithm.

2. (15%) (a) Please briefly explain the functions of a DNS server. (b) What are the differences between a network hub and a router? (c) Please briefly describe the roles of ROM during the booting process.

3. (10%) Identify the mask and logical operation needed to convert the IP address140.116.38.1 to 140.116.0.0 and 141.117.39.2 to 141.117.0.0, respectively. Use the same mask and logical operation for both conversions.

4. (10%) *Inheritance* is one of the important features of object-oriented programming. Please explain what Inheritance is.

5. (20%) The following table represents a portion of a linked list in a computer's memory. Each entry in the list consists of two cells. The first contains a letter of the alphabet; the second contains a pointer to the next list entry. (a) Alter the pointers so that the letter **J** is no longer in the list. (b) Then, add the letter **M** to the list and alter the pointers so that the letter **M** appears in the list in its proper place in alphabetical order.

Address	Contents	
30	J	One entry, two cells
31	38	
32	B	
33	30	
34	X	
35	46	
36	N	
37	40	
38	K	
39	36	
40	P	
41	34	

6. (25%) What sequence of numbers would be printed by the following recursive procedure if we started it with N = 3? (Hint: 5 numbers would be printed)

```
procedure MysterPrint (N)
if (N > 0)
  then (print the value of N +1 and apply the procedure MysterPrint to the value N – 2) ;
Print the value of N + 2.
```