1. 【4 points ×4】Please answer the following questions in brief. To it, using diagram to assist your explanation will be a plus.
   (a) Explain the components of the e-mail address
      Johnson@frogs.animals.com
   (b) Describe the **client/server** model
   (c) **n-Tier** architecture
   (d) What is the difference between **gateway** and **bridge**?

2. 【5 points】(True or False) Please give your answer and state your reason. "A **non-recursive function** for computing some value may execute more rapidly than a **recursive function** that computes the same value."

3. 【5 points】(True or False) Please give your answer and state your reason. "One weakness of the C-style **array** is that the **insertion** and **deletion** operations can be quite time-consuming, especially for large sequences."

4. Answer the following questions in terms of the list: **Alice, Byron, Carol, Duane, Elaine, Floyd, Gene, Henry, Iris.**
   (a) 【3 points】Which search algorithm (sequential or binary) will find the name **Gene** more quickly?
   (b) 【3 points】Which search algorithm (sequential or binary) will detect the absence of the name **Bruce** more quickly?
   (c) 【3points】Which search algorithm (sequential or binary) will detect the absence of the name **Sue** more quickly?

5. Given the following diagram, where the numbers represent the time delays across a link:
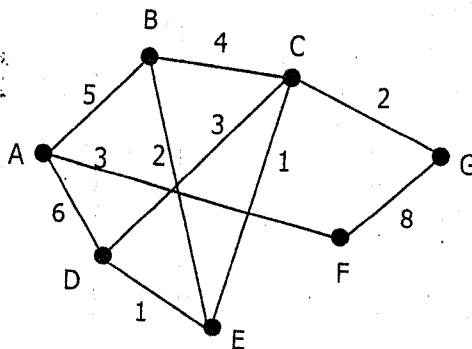
   (a) 【7 points】Please design an **algorithm** (in pseudo code, or in any computer programming language) to find **the shortest path** from node A to node G and its corresponding overall delay.

(b) 【7 points】 Considering your algorithm for (a), please design a data structure to store the graph.

(c) 【5 points】 If node **E** fails, would that change the shortest path? If so, what will be the new shortest path?

6. 【8 points】 It is easy to write **a sequential algorithm** that sums up a 100-element vector: $Sum = a_1 + a_2 + a_3 + \ldots\ldots + a_{100}$. To it, it is obvious that this algorithm will take about 100 units of time, where a unit of time is equivalent to the time needed to execute one iteration of calculation.

Assume that instead of having only a single processor, you have 100. Please state your opinion about how to apply the idea of **parallel processing** to speed up the solution to the previous computation.

7. 【9 points】 Please design a **relational database** containing information about parts, suppliers, and customers. Each part may be supplied by several suppliers and ordered by many customers. Each suppliers may supply many parts and have many customers. Each customer may order many parts from many suppliers; in fact, the same part may be ordered from more than one supplier. In your design, please consider the problem of **redundancies**.

8. 【4 points ×3】 Please give a brief description of each of the following terms:
   - RFID
   - C#.NET
   - MIS

9. 【5 points】 Please write the output of the given program code:

```
k = 18;
j = - 6;
while ( j <= k )
do {
      j = j + 4;
      k = k - 2;
cout <<" The sum of k+j = "<< k+j;
}
```

10. 【12 points】 Please design an algorithm (in pseudo code or in any computer programming language) to find the maximal integer of the variable **N** which satisfies the following equation :
$$Sum = 4 + 9 + 14 + 19 + \ldots\ldots + 94 + 99 + \ldots\ldots + N < 67000.$$