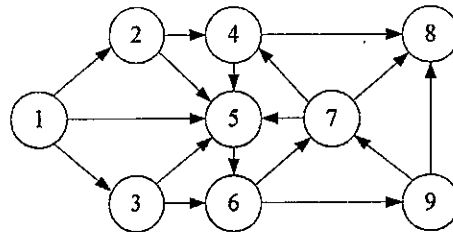


※ 考生請注意：本試題不可使用計算機。 請於答案卷(卡)作答，於本試題紙上作答者，不予計分。

1. Describe TCP/IP protocol stack. Explain the function of each layer. (15%) What are the features of IPv6 when compared with IPv4? (5%)
2. What are the search orders of a breadth-first-search (BFS) and depth-first-search (DFS) searching algorithms for the following graph? Show the final connected graphs for BFS and DFS respectively to receive full credit. (20%)



3. Write a program to show the first 25 numbers in a sequence that follows $F_{n+2} = F_n + F_{n+1}, \forall n \geq 1$. For instance, 1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, 144, ... Note that the first two given numbers in this sequence are 1 and 1. In addition, the program needs to show the quotient of $F_{n+1}/F_n, \forall n \geq 1$. (20%)
4. What is machine learning? List three commonly used machine learning approaches. What is the relation between machine learning and big data? (20%)
5. Let N be the set of nodes, n be the number of nodes, $d(i)$ be the distance label from source node s to node i , $A(i)$ be the set of outgoing arcs from node i , c_{ij} be the cost of arc (i, j) , $|S|$ be the number of elements in set S and $pred(i)$ be the predecessor of node i in a graph. Describe what the following algorithm does. (10%) What is the worst-case complexity of the algorithm? (10%)

```

begin
    S := ∅, S̄ := N
    d(i) := ∞ for each node i ∈ N
    d(s) := 0 and pred(s) := 0
    while |S| < n do
        begin
            let i ∈ S̄ be the node for which d(i) = min{d(j) : j ∈ S̄}
            S := S ∪ {i}
            S̄ := S̄ - {i}
            for each (i, j) ∈ A(i) do
                if d(j) > d(i) + cij then d(j) := d(i) + cij and pred(j) := i
        end
    end
end
    
```