1. (a) What are the differences and similarities between macro and subroutine( or function ). ( 15 points )
   (b) List features of subroutine( or function ). ( 5 points )

2. (a) Is it possible that a variable may have no identifier associated with it? Explain your assertion. (10 points)
   (b) Expain how a recursive procedure call can be done. (10 points)

3. (a) Given a two-hundred digits positive integer, design an algorithm to determine whether the number is prime or not using a 32 bits computer. ( 15 points )
   (b) Estimate how many years your algorithm may take to finish the job in worst case, if there is a PC that can perform 1 million arithmetic operations of 200 digits numbers in 1 second. ( 5 points )

4. (a) Explain the differences and similarities between I/O buffer and cache. ( 10 points )
   (b) Would it be better to use cache as I/O buffer? Argue your assertion. ( 5 points )

5. (a) Define the following terms:
       linked list, queue, stack and binary tee. ( 10 points )
   (b) Describe how to merge 2 unsorted one-way circular linked lists in O(1) time bound. ( 8 points )
   (c) Describe how to delete an element with index k from a unsorted array of size n in O(1) time bound. ( 7 points )