註：本次考試　不可以參考自己的書籍及筆記；　不可以使用字典；　不可以使用計算器。

1. Convert the prefix expression to postfix notation and evaluate the expression with A = 3, B = 7, C = 5, D = 6, E = 2. (20%)

   (a) + A / * B C + - D E

   (b) || ! && A ! || < B C > C D < C E

2. At each of the marked comments, draw the doubly linked list. (20%)

   ```
   DblListNode<int>  intlist = new DblListNode<int>;
   DblListNode<int>  newnode, curr;

   newnode = new DblListNode<int>(5);
   newnode.next = intlist.next;
   intlist.next.prev = newnode;
   newnode.prev = intlist;
   intlist.next = newnode;                    // (a)

   newnode = new DblListNode<int>(3);
   newnode.prev = intlist.prev;
   intlist.prev.next = newnode;
   newnode.next = intlist;
   intlist.prev = newnode;                    // (b)

   curr = intlist.next;
   curr = curr.next;
   curr.data = 15;                            // (c)

   curr = curr.prev;
   curr.prev.next = curr.next;
   curr.next.prev = curr.prev;                // (d)
   ```

3. For the input {51, 18, 30, 79, 99, 26, 83, 36, 9, 77, 15, 60, 20}. (30%)

   (a) Draw the insertion process one after one to construct a binary search tree. (10%)
   (b) Show the result of performing "*deletion of* 18" from the tree (a). (5%)
   (c) Draw the insertion process one after one to construct a binary *maximum* heap. (10%)
   (d) Show the result of performing "*deletion of maximum*" from the heap (c). (5%)

4. For the input {51, 18, 30, 79, 99, 26, 83, 36, 9, 77, 15, 60, 20}, please draw the process of *mergesort* to sort them in increasing order. (10%)

5. Consider an ordered array {9, 15, 18, 20, 26, 30, 36, 51, 60, 77, 79, 83, 99}; list the values of first, last, and middle at each iteration by binary search when searching for targets of 25 and 79. (20%)