15pts **1.** Draw the representation of the following binary tree using

(5pts) each
(a) one dimensional array
(b) linked list
(c) threaded linked list (replacing the left/right empty links of a node P by pointers to the nodes which would be printed before/after node P when traversing the binary tree in inorder)

```
        A
       /
      B
     / \
    C   D
   /
  E
```
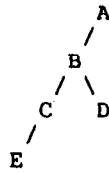
10pts **2.** Use the hash function $f(X) = X$ mod 11 to store the sequence of integers 82, 31, 28, 4, 45, 27, 59, 79, 35 in the hash table H[0..11]

(a) Use linear probing and assume each bucket only has one slot (5pts)
(b) Use chaining (5pts)

10pts **3.** For the heap below, show the tree after entering the sequence of the integers 55, 27, 45, 60. (5pts)

```
              50
            /    \
          30      40
         /  \    /  \
        20   5  25   35
       / \  /
      10 15 3
```

Finally draw the tree after applying a dequeue operation. (5pts)

(10pts) **4.** Given the assignments
```
        (setq x '(a (b (c) d) e))
        (setq y '((1 2) (3 4) (5 6) (7 8)))
```

what is returned by these Lisp expressions:

(2pts) a. (cddr x)
(3pts) b. (cons (car x) (car y))
(5pts) c. (fn y)
```
        where fn is defined by
        (defun fn (z)
              (cond ((null z) 1)
                    ( t (times (cadar z) (fn (cdr z))))
              ))
```
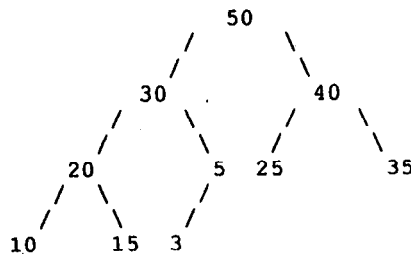
◀ 注意背面尚有試題 ▶

淡江大學九十一學年度碩士班招生考試試題

系別：資訊工程學系　　　科目：計算機概論（含資料結構、程式語言結構）

准帶項目請打「○」否則打「×」	
計算機	字典
✗	✗

98-2

本試題共 2 頁

(20pts) 5. Consider the following BNF definition of 'expression':

```
<expression>  ::= <term> | <expression> * <term>
<term>        ::= <factor> + <term> | <factor> - <term> | <factor>
<factor>      ::= <name> | - <name>
<name>        ::= a | b | c | d | e
```

a) Derive the following expression: (8pts)

   - a + b + c * d * - e -a

b) Insert parentheses in the expression to indicate the interpretation placed on it by the grammar. (4pts)

c) Draw a syntax diagrams that define the syntactic category of <expression>. Use NO RECURSION in your diagrams. (8pts)

6 For the following program, draw the run-time execution stack at each point where output is produced and show the results of that output. Assume that access to nonlocal variables is by means of the static chain method. In your run-time stack you may omit the dynamic links and the return address, but be sure to show the procedure parameters.

```
program main (output);
  var n, u: integer;

  procedure a (z: integer);
    begin
      writeln('In a, z = ', z:1, ' and u = ', u:1)
    end;

  procedure b (procedure x(z: integer));
    var u: integer;

    procedure c (z: integer);
      begin
        writeln('In c, z = ', z:1, ' and u = ', u:1)
      end;

    begin
      u := 50 + n; x(n+100); n := n-1;
      if n > 0 then b(c)
    end;

  begin {main}
    n := 3; u := 5; b(a);
  end.
```

7 The IEEE standard double-precision floating-point operand format consists of 64 bits. The sign occupies 1 bit, the exponent has 11 bits, and the fraction occupies 52 bits. The exponent bias is 1,023 and the base is 2. There is an implied bit to the left of the binary point in the fraction. Infinity is represented with a biased exponent equal to 2,047 and a fraction of 0.

(a) Give the formula for finding the decimal value of a normalized number.

(b) Calculate the largest and smallest positive normalized numbers that can be accommodated.