

## Homework #5

#1. Consider the following program outline. Show the run-time stack at the two places indicated below. Show static and dynamic links as well as values of variables as they would exist within the activation records at run-time.

```
Program main();
  procedure P (int a);
    procedure Q (int b);
      { ← *** Show stack now (1st)
        R(a+2,b+3);
      }
    {
      Q(a+1);
    }
  Procedure R (int c; int d);
    { ← *** Show stack now (2nd)
    }
  {
    P(1);
  }
```

(a) 1<sup>st</sup> stack (1 Point)

(b) 2<sup>nd</sup> stack ( 1 Point)

#2. What would a compiler designer have to do to implement recursion in Fortran?

#3. Where would the element A(1,2,3) of a 5x5x5 array be stored assuming the first element is A(0,0,0)

#4. Give two criteria for static storage allocation. Explain why this prohibits both recursion and nesting

#5. Using the recursive descent routines from Section 6.3.6 of and your class notes, show the steps in creating an abstract syntax tree for  $a = b * c$ . Show the evolution of the tree clearly – don't just write down the final tree.