

# Assignment 4

## Programming Languages

1. [20 pts, scope] Consider the following Ada skeletal program:

```
procedure Main is
  X : Integer;
  procedure Sub1 is
    begin -- of Sub1
      Put(X);
    end; -- of Sub1
  procedure Sub2 is
    X : Integer;
    begin -- of Sub2
      X := 10;
      Sub1;
    end; -- of Sub2
  begin -- of Main
    X := 5;
    Sub2;
  end; -- of Main
```

- (a.) What value of X is printed in procedure Sub1, when static scoping used?  
(b.) What value of X is printed in procedure Sub1, when dynamic scoping used?  
(Hint: If necessary an Ada interpreter: [http://www.tutorialspoint.com/compile\\_ada\\_online.php](http://www.tutorialspoint.com/compile_ada_online.php))

2. [30 pts, scope] Consider the following program:

```
void fun1(void); /* prototype */
void fun2(void); /* prototype */
void fun3(void); /* prototype */
void main() {
  int a, b, c;
  ...
}
void fun1(void) {
  int b, c, d;
  ...
}
void fun2(void) {
  int c, d, e;
  ...
}
void fun3(void) {
  int d, e, f;
  ...
}
```



Given the following calling sequences and assuming that dynamic scoping is used, what variables are visible during execution of the last function called? Provide the name of the function that the variable is defined?

Main call fun1, fun1 calls fun2, fun2 calls fun3

Main call fun1, fun1 calls fun3

Main calls fun2, fun2 calls fun3, fun3 calls fun1

Main calls fun3, fun3 calls fun1

Main calls fun1, fun1 calls fun3, fun3 calls fun2

Main calls fun3, fun3 calls fun2, fun2 calls fun1

3. [5 pts, L-value, r-value] Consider the following C statements. Comment about their validity and the L-value, r-value values of the variables. (Hint: You might try a C compiler if necessary)

(a.) `int var = 10;`

(b.) `int* good_addr = &(var + 1);`

(c.) `int* addr = &var;`

(d.) `&var = 20;`

(e.) `*++var = 30;`

(f.) `++*var = 40;`

(g.) `int* var = (void *)50;`

(h.) `++&addr = &var;`

(i.) `int* var_addr = &2;`

(j.) `var++ = 60;`

