Tuesday 07/06/2022 Final Exam Duration: 90 minutes

Name: Student No: _____

Important: In questions 1,2,3,4,6, let `V` and `W` be the last two digits of your student ID. For example, if your Student ID is 20190808073, then set `V=7`, `W=3`. Solve the question accordingly. Write your parameters here and fill in the blank spaces in the comments before starting: `V = _` `W = _`

P1 [10 points]

a) What will be the result of the C code below?

```c
int x = V; // V = _
if (x || ++x)
  if (++x || x)
    printf("x=%d\n", x);
```

Answer:

b) What will be the result of the C code below?

```c
int i = W+10; // W+10 = __
while (i > V+1) { // V+1 = __
  switch (i%2) {
    case 1: i = 3*i+1;
    case 0: i = i/2;
  }
  printf("%d ",i);
}
```

Answer:

P2 [10 points]

What will be the result of the C code below?

```c
int j=W+2; //W+2 = __
goto labela;
for(j = W; j<W+4; j++) { //W+4 = __
  printf("Loop started\n");
  goto labelb;
  labela:
  printf("label A %d\n",j);
  labelb:
  printf("label B %d\n",j);
}
```

Answer:

What will be the result of the Python code below?

```python
def f():
  yield "A"
  yield "B"
  return "C"
  yield "D"
obj = f()
print(type(obj))
for x in obj:
  print(x)
```

Answer:

P3 [10 points]

```c
int f(int *i) {
    *i += V; //V = _
    return 5;
}
int g(int *i) {
    *i += W; //W = _
    return 10;
}
void main() {
    int x = 0,y=0;
    int z = f(&x)+x+g(&y)+y;
    printf("z=%d\n",z);
}
```

Consider the given C program. What will the result be, assuming

a. operands are evaluated left to right?

b. operands are evaluated right to left?

P4 [10 points]
Consider the JavaScript code:

```
var x;
function sub1() {
  document.write("x="+x+""); }
function sub2() {
  var x;
  x = V+10; //V+10 = __
  sub1(); }
x = W; //W = _
sub2();
```

a. What will be the result assuming static scoping?

b. What will be the result assuming dynamic scoping?

P5 [30 points]

Consider the program:

```
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 subprogram activated? (-> means "calls") For visible variables, write the name of the function where it is declared. An answer should look like: a (main); b,c (fun2); d,e(fun3)

a. `main->fun1->fun2->fun3` Visible:_____

b. `main->fun1->fun3` Visible:_____

c. `main->fun2->fun3->fun1` Visible:_____

d. `main->fun3->fun1` Visible:_____

e. `main->fun1->fun3->fun2` Visible:_____

f. `main->fun3->fun2->fun1` Visible:_____

P6 [10 points]
Consider the following C program:

```
void fun (int first, int second) {
  first += first;
  second += second;
}
void main() { // V = _   W+10 = __
  int list[2] = {V, W+10};
  fun(list[0], list[1]);
}
```

For each of the following parameter-passing methods, what are the values of the list array after execution?

Pass-by-value	Pass-by-reference

P7 [35 points]
a) What will be the result of the Scheme expression below?

```
(CADDR '(((A K) (D E) N) (I Z) (C S) E))
```

Answer:

b) What will be the result of the Scheme expression below?

```
(CONS '(A K) (CONS '(D E) (CONS '(N I Z) '(C S E))))
```

Answer:

c) Given the Scheme function f, what will be the results of the calls on the right?

```
(DEFINE (f s lis)
 (COND
  ((NULL? lis) '() )
  ((EQUAL? s (CAR lis)) (CDR lis))
  (ELSE (f s (CDR lis)))
))
```

```
(f 't '(a g c t a t g c))     ->
(f 't '(a g c (t a) t g c))   ->
(f 't '(a g c t (a t g) c))   ->
```