CS_GY 6373 Programming Languages Fall 2020 Final Exam

Directions: Submit one pdf file only, put your name (last, first) as the name of the file. Inside the file also put your name (Last, First) and N number. Keep your answers in order in your file 1, 2 …

1) (20 pts) Consider the following program written in C syntax:

```
void swap (int a, int b) {
int temp;
temp = a;
a = b;
b = temp;
}
void main() {
int value = 2, list[5] = {1, 3, 5, 7, 9};
swap(value, list[0]);
swap(list[0], list[1]);
swap(value, list[value]);
}
```

For each of the following parameter-passing methods, what are all of the values of the variables *value* and *list* after each of the three calls to swap?

a) (10 pts) Passed by reference

Value	List[0]	List[1]	List[2]	List[3]	List[4]
2	1	3	5	7	9

b) (10 pts) Passed by value-result

Value	List[0]	List[1]	List[2]	List[3]	List[4]
2	1	3	5	7	9

CS_GY 6373 Programming Languages Fall 2020 Final Exam

Directions: Submit one pdf file only, put your name (last, first) as the name of the file. Inside the file also put your name (Last, First) and N number. Keep your answers in order in your file 1, 2 …

2) (20 pts) What does the following program do. Show the output. Explain.

```
#include <stdio.h>
#include <setjmp.h>

jmp_buf bufferA, bufferB;

void routineB();

void routineA() {
   int r ;
  printf("(A1)\n");

   r = setjmp(bufferA);
   if (r == 0) routineB();
   printf("(A2) r=%d\n",r);

   r = setjmp(bufferA);
   if (r == 0) longjmp(bufferB, 20001);
   printf("(A3) r=%d\n",r);

   r = setjmp(bufferA);
   if (r == 0) longjmp(bufferB, 20002);
   printf("(A4) r=%d\n",r);
}
void routineB() {
   int r;
   printf("(B1)\n");

   r = setjmp(bufferB);
   if (r == 0) longjmp(bufferA, 10001);
   printf("(B2) r=%d\n", r);

   r = setjmp(bufferB);
   if (r == 0) longjmp(bufferA, 10002);
   printf("(B3) r=%d\n", r);

   r = setjmp(bufferB);
   if (r == 0) longjmp(bufferA, 10003);
}
int main(int argc, char **argv)  {
   routineA();
   return 0;
```

CS_GY 6373 Programming Languages Fall 2020 Final Exam

Directions: Submit one pdf file only, put your name (last, first) as the name of the file. Inside the file also put your name (Last, First) and N number. Keep your answers in order in your file 1, 2 …

3) (20 pts) Show the stack with all activation record instances, including the dynamic chain, when execution reaches position 1 in the following skeletal program. This program uses the deep-access method to implement dynamic scoping.

```
void fun1() {
float a;
...
}
    void fun2() {
    int b, c;
    ...
    }
    void fun3() {
       float d;
       ...
    }
    void main() {
    char e, f, g;
    ...
    }
```

The calling sequence for this program for execution to reach `fun3` is

`main` calls `fun2`
`fun2` calls `fun1`
`fun1` calls `fun1`
`fun1` calls `fun3`

CS_GY 6373 Programming Languages Fall 2020 Final Exam

Directions: Submit one pdf file only, put your name (last, first) as the name of the file. Inside the file also put your name (Last, First) and N number. Keep your answers in order in your file 1, 2 …

4) (10 pts) Write a function in Prolog that takes two lists of integers and returns a list containing only those elements that are unique to both. i.e. func([1,2,3], [2, 4, 6]) -> [2]
5) (10 pts) Write a function in Julia that takes two lists of integers and returns a list containing only those elements that are unique to both. i.e. func([1,2,3], [2, 4, 6]) -> [2]
6) (10 pts) Write a function in Haskell that takes two lists of integers and returns a list containing only those elements that are unique to both. i.e. func([1,2,3], [2, 4, 6]) -> [2]
7) (10 pts) Describe the main features of Aspect Oriented Programming (AOP). Show examples from 3 languages that support AOP in part or in whole. Talk about the benefits of AOP as well as any shortcomings that may exist.