

LeMoyne-Owen College  
Division of Computer Science and Information Technology

COSI 350  
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Tuesday  
April 18, 2023

Exam 2

Name: \_\_\_\_\_

1. Consider the following C++ program **passing parameter by reference**: (6%)

```
int func( int &a)
{
    a += 2;
    return 4;
}

int main()
{
    int x = 3;
    x = x + func(x);
    cout << x <<endl;    // print(x)

    return 0;
}
```

- a. If the expression `x + func(x)` is evaluated **func(x)** first, what is the output?
  
- b. If the expression `x + func(x)` is evaluated **x** first, what is the output?

2. What is difference between the method of **pass-by-reference** and the method of **pass-by-value-result**? (5%)

3. Rewrite the nest-if-else statement by **define a function of switch**: (5%)

<pre>year = int(input("Enter years in college:\n")) if year == 1:     stage = "Freshman" elif year == 2:     stage = "Sophomore" elif year == 3:     stage = "Junior" elif year == 4:     stage = "Senior" else:     stage = "Invalid year value" print(stage)</pre>	<p>Rewrite to a function of switch: using a dictionary concept.</p>
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4. Consider the following program segments in Python: (10%)

<pre>j=3 i=0 while i&lt;5:     if i==2:         i += 1         continue     print("%d %d" % (i,j))     j -= 1     i += 1</pre>	<p>Rewrite it without <b>continue</b>:</p>
<p>What will be output?</p>	

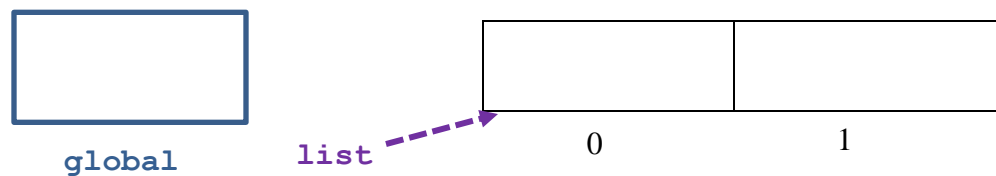
5. Consider the following program segments in Python: (10%)

<pre>j=3 i=0 while i&lt;5:     if i==2:         break     print("%d %d" % (i,j))     j -= 1     i += 1</pre>	Rewrite it without <b>break</b> :
What will be output?	

6. Consider the following program using **pass-by-name**: (6%)

```
int global;
void sub(int a)
{
    a = 8;
    global = global + 1;
    a = 16;
}
int main()
{
    int list[2]={4, 4};
    global = 0;
    sub(list[global]);
    return 0;
}
```

What will be stored in the following memory boxes at the end of program?



7. Consider the following program using **pass-by-reference**:

```
int sub(int & a)
{
    a--;    // a = a - 1;
    return a + 2;
}
void main()
{
    int x = 999;
    int temp;
    temp = sub(x);
}
```

What will be stored in the following memory boxes at the end of program? (4%)



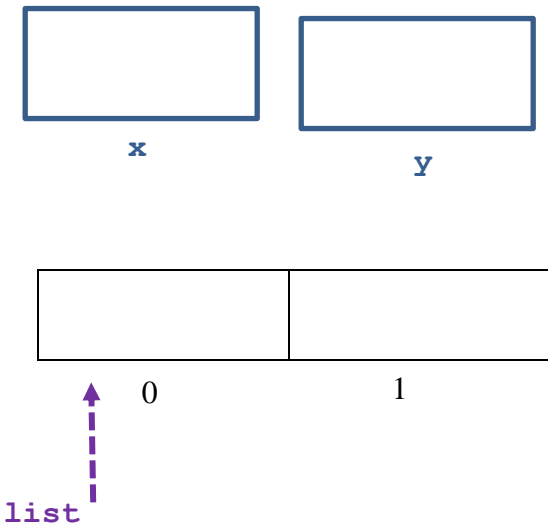
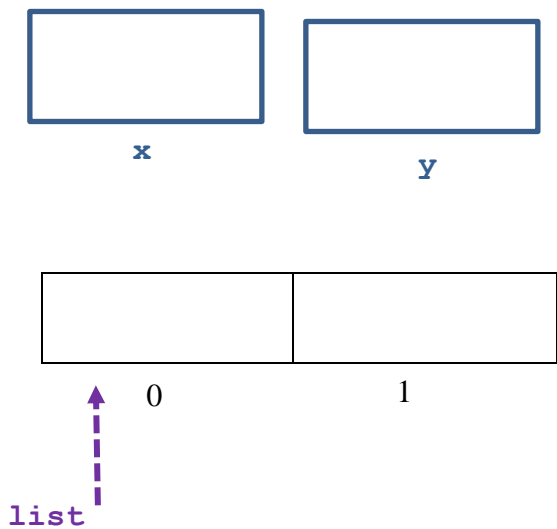
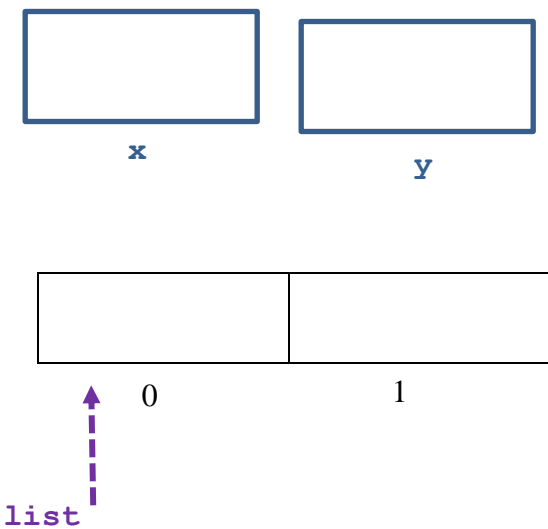
**x**



**temp**

8. What are the three characteristics of Object-Oriented Programming? Describe them in detail. (5%)

9. Consider the following program segments: (24%)

<pre> int sub(int a, int b) {     a = a + b;     return 2 * a; } int main() {     int x = 0, list={1, 5};     int y = sub(x, list[x]) + x;     return 0; (1) } </pre>	<p>Use <b>pass-by-value</b>.</p> <p>What is in the memory at level (1)?</p> 
<p>Use <b>pass-by-value-result</b>. Assume argument &amp; parameter are bound <b>when function is called</b>, and expression is evaluated from <b>left to right</b>.</p> <p>What is in the memory at level (1)?</p> 	<p>Use <b>pass-by-value-result</b>. Assume that <b>the binding argument &amp; parameter will be changed when function is returned</b>, and expression is evaluated from <b>left to right</b>.</p> <p>What is in the memory at level (1)?</p> 

10. Consider the JavaScript program below:

```
var X;
function Sub1() {
    document.write("X = " + X);
}
function Sub2() {
    var X;
    X = 80;
    Sub1();
}
X = 40;
Sub2();
```

a. Under **static** scoping rules, what is the output?(5%)

b. Under **dynamic** scoping rules, what is the output?(5%)

11. Consider the following program with the **recursive** function.

```
def func(b):
    c = b // 2      # whole number division
    if b <= 1:
        return 1
    else:
        return b + func(c)

if __name__ == "__main__":
    a = 8
    x = func(a)
    print(x)
```

a. What will be **output?** (5%)

Answer this question after you complete part(b)

b. Show the stack with all activation record instances, including static and dynamic chains. (10%)

