CS61B, Fall 1997
Midterm #1
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Problem #1

(2 points) What is y after the following code executes?

```
static void addOne (int x){
   x += 1;
}
int y = 3;
addOne(y);
```

Answer:

Problem #2

(8 points) Answer questions about the following classes. For parts b-e, choose one of the following:

CE: The code will result in a compiler error from javac.
RT: The code will compile without errors, but will cause an error of some kind run time.
OK: The code will compile and run without errors. Show what the program will print.

```
abstract class A {
   abstract public void foo ();
}
class B extends A {
   public void foo () { System.out.println("Calling B.foo");}
   protected int value = 0;
}
class C extends B {
   public void foo () { System.out.println("Calling C.foo," +
value);}
}
class D extends C {
   public void foo () { System.out.println("Calling D.foo()," +
value);}
}
```

a. (2 points)

```
A a1 = new A();
a1.foo();
```

b. (2 points)

```
A a2 = new B();
a2.foo();
```

c. (2 points)

```
A a3 = new C();
a3.foo();
```

d. (2 points)

```
B b4 = new D();
((C) b4).foo();
```

Problem #3

(12 points) Consider the following ListNode class definition.

```
class ListNode {
   int item;
   ListNode next;
   /** Postcondition: Constructs a new listnode containing i and n
*/
   ListNode (int i, ListNode n) { item = i; next = n; }
}
```

a. (4 Points) Complete the following code to copy a list.

```
/** Postcondition; returns a copy of l. (Copies all the nodes).
*/
private static ListNode copy(ListNode l) {
   if (l == null) return l;
   else {
      return (new ListNode (_____________ , _____________));
   }
}
```

b. (4 Points) Complete the following code to merge 2 sorted lists.

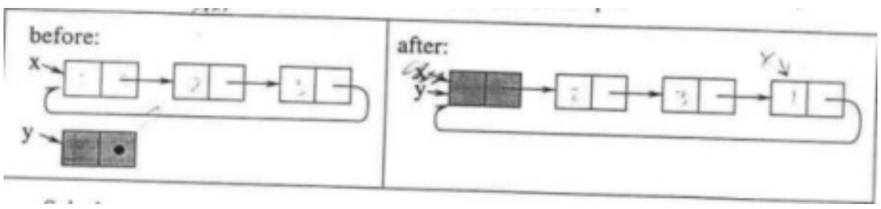
```
/** Precondition: ln1 and ln2 are sorted
 *  Postcondition: returns a new sorted list with all the
   elements of ln1 and ln2, modifying ln1 and ln2 in the process. */
```

```
private static ListNode merge(ListNode ln1, ListNode ln2) {
   if (ln1 == null) return (ln2);
   if (ln2 == null) return (ln1);
   if (ln1.item <ln2.item) {

      _____________________________ ;
      return ln1;
   }
   else {

      _____________________________ ;
      return ln2;
   }
}
```

c. (4 Points) Given a non-empty cyclic list x and a single node y, write 2 lines of code to insert y into x after the position x points. Here is an example:



Solution:____

____

Problem #4

(6 Points) The following function will sort a stack, placing the smaller elements toward the bottom of the stack. Fill in the missing 2 lines.

```
public static void stackSort (IntStack s1){
   if (s1.isEmpty()) return;
   IntStack s2 = new IntStack();
   int tmp;
   int count = s1.size();
   while (count > 0) {
      int min = s1.pop()
      for (int j = 1; j <count; j++) {
     tmp = s1.pop();
     if (tmp  <min) {

         ________________________________

            ________________________________
         }
         else {
                s2.push(tmp);
            }
        }
        s1.push(min);
        while (!s2.isEmpty()) {
            s1.push(s2.pop());
        }
        count--;
    }
}
```

/** * file : IntStack.java * desc : Implements the class Stack */ public class IntStack { /** * post : constructs an empty stack */ public IntStack() { max = 10; elems = new int [max]; top = 0; } /** * post : returns true <==> stack is empty */ public boolean isEmpty() { return (top == 0); } /** * post : returns the number of elements in the stack */ public int size() { return (top); } /** * pre : isEmpty() == false * post: removes and returns element at the top */ public int pop() { return elems[--top]; } /** * post : put elem at the top */ public void push(int elem) { checkSize(); elems[top++] = elem; } public String toString () { String result = [; for (int i = 0; i < top; i++) { result += elems[i] + ; } result +=]; return result; } // private fields private int max; // Current capacity of stack private int top; // Current number of stack elements. private int[] elems; // Data in stack (elems[t-1] is top). /** * post : If the stack was full, the capcity is expanded * (doubled) */ private void checkSize() { if (top == max) { // double the capacity int newmax = max << 2; int[] newelems = new int [newmax]; // copy the data int i; for (i = 0; i < max; i++) newlems[i] = elems[i]; // point to the new data max = newmax; elems = newelems; } } }
