

## CS 100J Prelim 2 Fall 2006 Answers

**Question 1. (a)** Local variable: A variable declared in the body of a method. It is created when the frame for a call is created, before execution of the method body.

**(b)** // Store in c the number of positions k in Strings s1  
// and s2 such that s1[k] == s2[k]  
**int** n= Math.min(s1.length(), s2.length());  
**int** c= 0;  
// invariant: c = no. of positions i in s1[0..k-1] and  
// s2[0..k-1] such that s1[i] == s2[i]  
**for** (**int** k= 0; k < n; k= k+1) {  
    **if** (s1.charAt(k) == s2.charAt(k))  
        c= c+1;  
}  
// c = no. of positions i in s1[0..n-1] and s2[0..n-1]  
// such that s1[i] == s2[i]

**Question 2. (a)** c.Bigger(a) : **true**,

**(b)** a.getJob(): ERROR. Apparent class is Student.

**(c)** c.getJob(): "work-study",

**(d)** d.getJob(): "Cabbie",

**(e)** c.getSound(): "I'm new here.",

**(f)** d.getSound(): "",

**(g)** ((Frosh)a).getSound(): "I'm new here.",

**(h)** ((Frosh)d).getSound(): ERROR,

**(i)** ((Senior)d).getSound(): "",

**(j)** ((Senior)a).getSound(): ERROR.

**Question 3.**

/\*\* Constructor: a Senior with major "CS",  
    name m, and gpa of 3.8. \*/

```
public Senior(String m) {  
    super(m, 3.8);    major= "CS";  
}  
/** = "ob is a non-null Senior with the same  
    fields as this Senior" */  
public boolean equals(Object ob) {  
    if (ob == null) return false;  
    if (!(ob instanceof Senior)) return false;  
    Senior obs= (Senior) ob;  
    return this.major.equals(obs.major) &&  
        this.getName().equals(obs.getName()) &&  
        this.getGpa() == obs.getGpa();  
}
```

**Question 4.** /\*\* Edit string s as described in q. 4 \*/

```
public static String edit(String s) {  
    String res= "";  
    // inv: res contains the processed s[0..k-1]  
    for (int k= 0; k != s.length(); k= k+1) {  
        // If res is empty or ends in ". " (but not "i.e."),  
        // append capitalized s[k] to res;  
        // otherwise append s[k] to res.  
        if ((res.length() == 0 || res.endsWith(". ")) &&  
            !res.endsWith("i.e. ")) {  
            res= res +  
                Character.toUpperCase(s.charAt(k));  
        }  
        else res= res + s.charAt(k);  
        if (res.endsWith(".\n"))  
            res= res.substring(0, res.length()-2) + "\n";  
    }  
    return res;  
}
```

**Question 5. (a)** /\*\* = i as a string but with leading 0's,  
    if necessary, so that it is 3 digits  
    Precondition: 0 <= i < 1000 \*/

```
public static String digit3(int i) {  
    if (i < 10)    return "00" + i;  
    if (i < 100)  return "0" + i;  
    return  "" + i;  
}  
/** = A string that contains a representation of i, but  
    with a comma every three digits.  
    Precondition: i > 0.  
    Example: toString(5243642) is "5,243,642"*/  
public static String toString(int i) {  
    if (i < 1000)  return  "" + i;  
    return toString(i/1000) + "," + digit3(i%1000);  
}
```

**(b)** /\*\* = no. elephants in this Elephant's family tree \*/

```
public int treeSize() {  
    int size= 1;  // for this elephant.  
    if (father != null) size= size + father.treeSize();  
    if (mother != null) size= size + mother.treeSize();  
    return size;  
}
```