This exam is open text book but closed-notes, closed-calculator, closed-neighbor, etc. Questions are worth different amounts (in particular, the final two questions are worth substantially more than any other questions), so be sure to look over all the questions and plan your time accordingly. Please sign the honor pledge here:

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Note: When an integer type is required use `int`, *when a floating-point type is required use* `double`.

Note: The last two pages are for additional space to use on any problem. It must be CLEARLY stated which problems are on those pages (and those problems must state to look on pages 9 or 10)

1. (2 points) What section are you in?

   ____ CS 101-E   ____ CS 101-2 (lab 7-8:30 PM Thu)

   ____ CS 101-3 (lab 12-1:30 PM Fri)   ____ CS 101-4 (lab 2-3:30 PM Fri)

2. (2 points) What is your overall impression of the class so far? Check only one in *each* column.

   ___ Too slow   ___ Too easy

   ___ Too fast   ___ Too hard

   ___ Just right   ___ Just right

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3. (4 points) Evaluate the following expressions and give the value:

   (a) `true || true && false`   _____

   (b) `20 < 30 && 5 * -1 + 2 >= 0`   _____

   (c) `! false && true`   _____

   (d) `10 == 20 ? -1 : 0`   _____

4. (3 points) What is the output of the following code segment?

```
int i = 5;
System.out.println(i++);
System.out.println(++i);
System.out.println(i);
```

5. (3 points) What is the value of variables `j`, `k`, and `flag` after the following code segment?

```
int j=5;
int k=10;
boolean flag = false;

if (flag == j < k)
   j += k;
else
   k += j;
```

6. (5 points) In the following code, assume that the `ask()` method of the `magicEightBall` object returns a `boolean` value.

```
int j=5, k=10;
boolean flag = true;

if (flag == magicEightBall.ask() && j < ++k)
   j = 100;
else
   j = 150;
```

   (a) What is the value of variables `j`, `k`, and `flag` after the following code executes assuming that the `magicEightBall.ask()` returns `true`?

   (b) What is the value of variables `j`, `k`, and `flag` assuming that it returns `false`?

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7. (5 points) The following code has a bug:

```
// print the even numbers between 0 and 10
int j = 2;
for (int i=0; i<10; i++);
{
    if (i % j == 0) { System.out.println(i); }
}
```

(a) Does the above code compile?   [yes/no]: _____

If "yes", what is the output? If "no", why not?

(b) Describe how to fix the bug and give the output of the code after the bug is fixed.

8. (5 points) The following code has a bug:

```
final int BASE = 2;
int j = BASE;
for (int i=2; i<=4; ++i)
{
    j *= j;
}
System.out.println(BASE + " to the " + i + "th power = " + j);
```

(a) Does the above code compile?   [yes/no]: _____

If "yes", what is the output? If "no", why not?

(b) Describe how to fix the bug and give the output of the code after the bug is fixed.

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9. (12 points) Consider the following code segment. **a**, **b**, **c**, and **d** are **boolean** variables:

```
if (!c || d) {
    if (a && c) {
        System.out.println("Schmoo");
    }
    else if (b) {
        System.out.println("Spoon");
    }
    else {
        System.out.println("Wahoo");
    }
}
else if (!c == d) {
    System.out.println("Big Gulp");
}
else if (c) {
    System.out.println("Fries with that?");
}
```

(a) Give values for **a**, **b**, **c**, and **d** that cause "Schmoo" to be displayed, or state that no such set of values exist.

(b) Give values for **a**, **b**, **c**, and **d** that cause "Spoon" to be displayed, or state that no such set of values exist.

(c) Give values for **a**, **b**, **c**, and **d** that cause "Wahoo" to be displayed, or state that no such set of values exist.

(d) Give values for **a**, **b**, **c**, and **d** that cause "Big Gulp" to be displayed, or state that no such set of values exist.

(e) Give values for **a**, **b**, **c**, and **d** that cause "Fries with that?" to be displayed, or state that no such set of values exist.

(f) Give values for **a**, **b**, **c**, and **d** that cause nothing to be displayed, or state that no such values exist.

10. (3 points) Write the truth table for the logical expression: **! p || q**

p	q	! p || q
true	true	
true	false	
false	true	
false	false	

11. (3 points) Write the truth table for the logical expression: `! p || ! q`

p	*q*	`! p || ! q`
true	true	
true	false	
false	true	
false	false	

12. (7 points) Write a complete **switch** statement that, when given an **int** variable **x**, will print out the ordinal number. For example, when **x** is 1, the **switch** prints out '1st', when **x** is 2, the **switch** prints out '2nd', when **x** is 25, the switch prints out '25th', etc. This **switch** statement should handle all values from 0 to 30. Note that 1 and 21 have a 'st' ending, 2 and 22 have a 'nd' ending, 3 and 23 have a 'rd' ending, and all other numbers have a 'th' ending. This **switch** statement should use the minimal number of cases possible. You can assume that **x** will not be less than zero or greater than 30.

13. (6 points) What is the output of the following code segment?

```
for (int i=0; i<4; ++i) {
    if (i == 2) {
        continue;
    }
    for (int j=1; j<=3; ++j) {
        if (i == j) {
            break;
        }
        System.out.println(i + " " + j);
    }
}
```

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(20 points) Complete the program ON THE NEXT PAGE to implement the following flowchart, asking the user the questions shown in diamonds and providing the responses shown in rectangles. You should not print anything for the START and END boxes. For your convenience we have predefined strings for each question and response, and you may use the **YesNoExtractor** helper class that we provided in homework J3, which defines the following methods & constants:

- **public YesNoExtractor():** Default constructor; configures the new *YesNoExtractor* to display messages to standard output and extracts information from standard input (i.e. to use streams *System.out* and *System.in*)
- **public boolean askUser(String message):** Query user for a yes or no response after printing   *message*. If the user indicates yes, then true is returned.   If the user indicates no, then false is returned.
- **public final boolean YES = true;**
- **public final boolean NO = false;**

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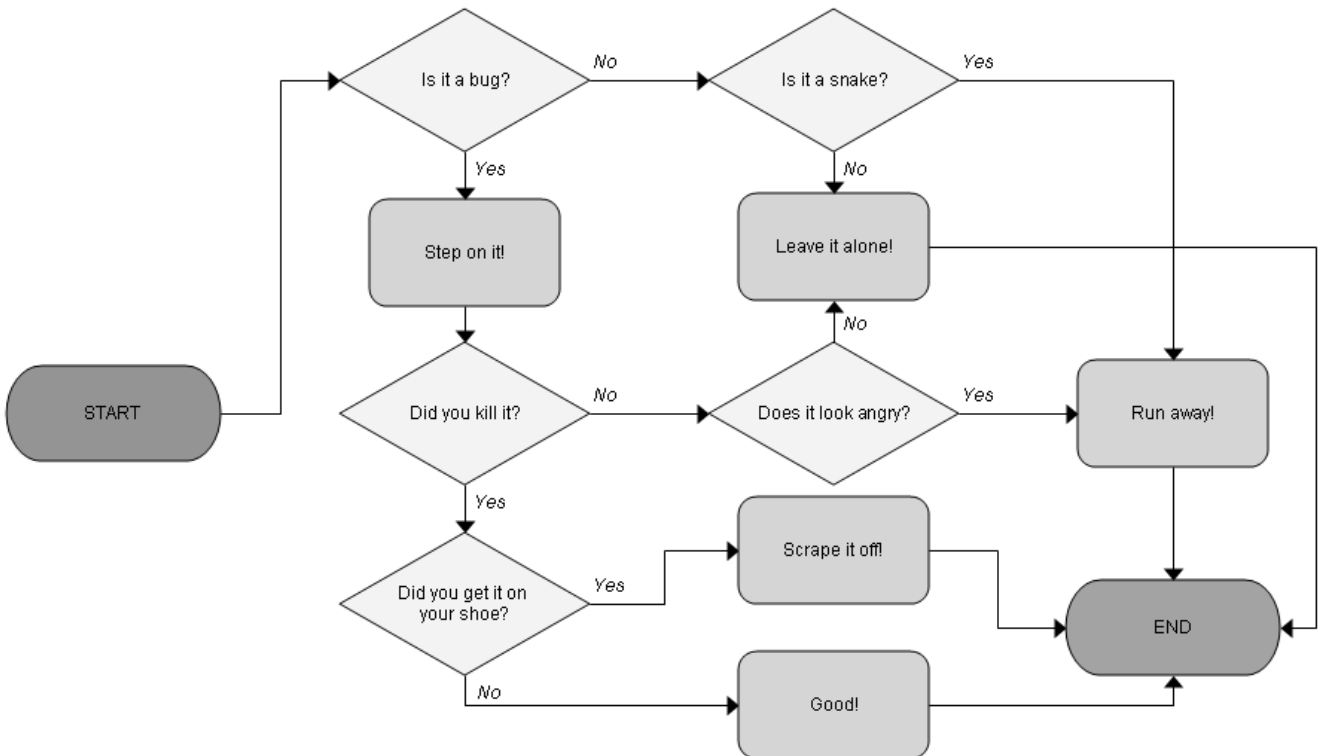
```
import java.util.*;

public class Debugger {
    final String Q1 = "Is it a bug?";
    final String Q2 = "Is it a snake?";
    final String Q3 = "Did you kill it?";
    final String Q4 = "Does it look angry?";
    final String Q5 = "Did you get it on your shoe?";
    final String R1 = "Step on it!";
    final String R2 = "Leave it alone!";
    final String R3 = "Run away!";
    final String R4 = "Scrape it off!";
    final String R5 = "Good!";

    public static void main(String args[]) {
```

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15. (20 points) Write an *entire, complete* Java program that prints out all of the seconds in a day from 1:00:00 AM to 11:59:59 PM, each on a separate line, in the following format: hour:minute:second [AM or PM]. For example, the first two lines your program prints should be "1:00:00 AM" and "1:00:01 AM". Your program should correctly handle the noon transition from AM to PM: after printing "11:59:59 AM", your program should print "12:00:00 PM". You should also handle the transition from 12 PM to 1 PM: after printing "12:59:59 PM" your program should print "1:00:00 PM". Hint: the simplest way to implement this may be for you to count hours in military time (in which 1 PM = 13:00, 2 PM = 14:00, etc) and to use an if-else statement in the body of the inner loop (for example to print the hour-minus-12 when the hour is greater than 12).

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This page for additional space for any previous problems.

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