MIDTERM EXAM  Introduction to Computer Science UA–CCI– ICSI 201–Spr14

This is a closed book and note examination, except for one 8 1/2 x 11 inch paper sheet of notes, both sides. There is no interpersonal or other communication or discussion (except with the prof. or proctors) or sharing of information. Cell phones or any electronic devices, other than a calculator or a pre–approved dedicated language translator are strictly forbidden! If you need to leave the room, leave your paper and ask permission. You may take NOTHING with you to leave the room. Failure to abide by any of these terms may result in a grade of zero for the exam.

14 multiple choice questions: 0 pts for omitted or wrong answers, 5 pts for correct answer. After that are 30 points worth of programming problems.

Write your name clearly on the front of the Scantron sheet.

Print your last name first AND BUBBLE IN THE BOXES on the back.

Print your UAlbany 7 decimal digit ID number AND BUBBLE IN THE BOXES on the back IF YOU DON’T KNOW (or are unsure of) your ID number, take a break during the exam and have the prof. or TA look up and write the number for you.

Select the ONE best answer to the question from the choices provided.

1. A Java comment consists of everything from // to the end of the line, or everything between a matching pair of /* and */ sequences.
   A Java comment
   a) commands the compiler to check that the code correctly carries out the purpose expressed by the comment.
   b) should sometimes be written (in this course) to express your purpose for writing the code near it. But it might be wrong.
   c) must express a valid purpose, or else there will be a syntax error.
   d) causes a runtime error or crash if it is faulty.
   e) must never be wrong, or else the program has logic errors.

2. What does Java’s built–in operator symbol = mean?
   a) assign or copy. They are the same thing.
   b) assign without copying. Assign and copy are different things.
   c) equals.
   d) express an equation for the computer to solve as in math class.
   e) test if two values are equal, returning a boolean true or false value.
3. Here is some Java code. What's printed when it runs? WARNING: TO MAKE SURE YOU GET THIS RIGHT, draw an A box, a B box, and actually write, cross out and rewrite the values as the does the lines below in sequence.

```java
int Adam;
int Billi;
Adam = 2;
Billi = 1;
Billi = Adam + 4; //line 5
Adam = Billi + 3; //line 6
System.out.print(Adam);
System.out.print(" "); //Space
System.out.print(Billi);
```

4. What if lines 5 and 6 were interchanged? DON'T GUESS.

```java
Adam = Billi + 3;
Billi = Adam + 4;
```

5. Reminder of how to DEFINE the `pin` method:

```java
public void pin(int x)
{
    System.out.print(x);
    return;
}
```

Reminder of how to CALL the `pin` method:

```java
pref.pin(7);
```

When the computer compiles and then runs some program that uses all the code above, what best describes the ORDER in TIME in which the computer does things?

a) The method is always called before the method is defined.
b) The method is always defined before the method is called.
c) The method might be called and then defined, or defined and then called, in either order.
d) Calling and defining are really the same thing.
e) Calling and defining occur at exactly the same time.
6. Which is most accurate about parameter variables and parameter values? The CALLER is the code that CALLS the method, and the CALLEE is the code written in the DEFINITION of the method. In other words, a CALLER initiates a method call (by calling a method) and CALLEES get called, that is, receives calls. The CALLEE runs the code in the method’s body.

   a) The parameter variable is declared in the CALLER and the parameter value is provided in the CALLEE.
   b) The parameter variable is declared in the CALLEE and the parameter value is provided in the CALLER.
   c) Parameter values and variables are the same thing and they both are in the CALLER.
   d) Parameter values and variables are the same thing and they both are defined in the CALLEE.

7. Java’s return operation (a little thing, built into the Java language) makes the computer return to what?
   a) It makes the computer return to the beginning of a loop.
   b) It makes the loop control variable’s value return to its original setting.
   c) It makes the computer return to the place right after where the call operation was done.
   d) It makes the Turtle return to its starting position, and, in the case of printing, it makes the next location to print into return to the beginning of the next line.

8. What does the Turtle draw when the program below runs?

   ```java
   public class TDemoApp {
       public static void main(String[] a) {
           Turtle tr = new Turtle( new World( ));
           tr.forward( 75 );
           tr.turn( 45 );
           tr.forward( 50 );
           tr.turn( 45 );
           tr.forward( 25 );
       }
   }
   ```

   ![Diagram](image)
9. This problem is a real puzzle: DO THE COMPUTATIONS ON PAPER except if you have a photographic memory. What does the program below print when it runs once?

```java
public class Puzzle
{
    public static void main(String[] a)
    {
        int B;
        int T;
        B = 0;
        T = 9;
        while ( B < T )
        {
            System.out.print( B );
            System.out.print( " " );
            System.out.print( T );
            System.out.print( " " );
            B = B + 1;
            T = T - 2;
        }
        System.out.print("X");
    }
}
```

(A) 0 9 1 7 X
(B) 0 9 1 7 2 X
(C) 0 9 1 7 2 5 X
(D) 0 9 1 7 2 5 3 X
(E) 0 9 1 7 2 5 3 3 X

10. What slope line is painted when the `mystery` method is called on a `RibbonablePicture`?

```java
public class RibbonablePicture extends Picture
{
    public void mystery( int sideLen )
    {
        int loopVar;
        loopVar = 0;
        while( loopVar <= sideLen )
        {
            Pixel pxToBlacken;
            pxToBlacken = this.getPixel( loopVar, sideLen - loopVar );
            pxToBlacken.setColor( java.awt.Color.black );
            loopVar = loopVar + 1;
        }
        return;
    }
    public RibbonablePicture(int w, int l) { super(w, l); }
}
```

(A) (B) (C) (D)
11 and 12 pertain to the application below:

```java
public class Spr14MidtermApp {
    public static void main(String[] a) {
        int varA;
        varA = 1; // Purpose: Loop variable setup.
        while (varA < 6) // Purpose: Test if YOU know exactly how while works!
        {
            System.out.print(varA); // Purpose: print the current value.
            // Purpose of the if..else:
            // print E or D depending of whether the current value is
            // even (E) or odd (D).
            if( (varA % 2) == 0 )
            {
                System.out.print("E");
            }
            else
            {
                System.out.print("D");
            }
            varA = varA+1; // Purpose: Update the loop control variable.
        }
        System.out.println(" And after the loop stopped...");
        if( (varA % 2) == 0 )
        {
            System.out.println("E");
        }
        else
        {
            System.out.println("D");
        }
    }
}
```

11. What is the first line it prints?
   a) 0E1D2E3D4E5D And after the loop stopped...
   b) 0E1D2E3D4E5D6E And after the loop stopped...
   c) 1D2E3D4E5D And after the loop stopped...
   d) 1D2E3D4E5D6E And after the loop stopped...

12. What is the second line it prints?
   a) E
   b) D

13. Which method is NOT defined in G&E's Turtle class? (Hint: What does NOT make sense for a Turtle to be commanded to do?)
   a) forward( int distance )
   b) turn( double angle )
   c) penUp( )
   d) penDown( )
   e) getPixel( int x, int y)

(Question 14 appears after the first of 2 programming problems.)
Turtle programming problem (15 points)

The latest UA branding committee decided on a new logo and sketched its plan.

Your job is to program the method below for drawing the logo whenever that method is called. We gave you the operation to start, and the `penUp` and `penDown` methods. Since time is limited, don't bother making the Turtle go back to its starting state when the logo drawing is finished.

```java
public class SunyATurtle extends Turtle {
    public SunyATurtle(World w) { super(w); }
    public void logo(int size) {
        // Purposes: Draw the U. YOU code
        // instructions for that HERE.
        this.turn(180); // The left side of the U should be drawn downward.
        this.penUp(); // Purpose: Prevent extra lines as the Turtle gets from the end of
        // the U to the beginning of the A.
        // Purpose: Make the Turtle get to the beginning of the A.
        this.penDown(); // Purpose: Make the 3 lines of the A get drawn when, eventually, the
        // Turtle traces them.
        this.penDown(); // CONTINUE WRITING CODE ON THE NEXT PAGE!!
    }
}
```
// Purposes: Actually draw the three lines to make the A. The
// horizontal cross-line in the middle of the A should NOT be drawn
// again because it was already drawn as the bottom of the U. Clever! (?)

// Purpose: Resume following the Apps instructions from right
// after the method call to the logo method.
  return;
  } // Closing brace of the logo method body
} // Closing brace of the SunyATurtle class definition

The last multiple choice question (#14):

What should be the name of the file in which you must save (perhaps using 
Save As ...) the Java code that you have written above?

  a) MyApp.java or other name.java not below.
  b) SunyATurtle.java
  c) SunyATurtle.class
  d) Turtle.java
  e) Turtle.class
Digital Picture and loop programming problem. (15 points)

Finish writing the code to define the method below so that when it is called on a RibbonablePicture, it makes the computer draw the figure shown. REVIEW a previous multiple choice problem for programming reminders and hints. BUT...for full credit, you MUST demonstrate you know what you are doing by writing THE PURPOSE of EVERY line of Java that YOU write in this problem.

public class RibbonablePicture extends Picture
{
    public void diagAndVert( int sideLen )
    {
        //YOU write code and purposes BELOW! Start here and
        //continue onto the next page if necessary. You can use two
        //separate (not nested) loops or just one loop;
        //that's up to you.
(This is the last sheet of the exam. It is blank except for what you are reading here.)