• **INSTRUCTIONS:**

  – DO NOT WRITE YOUR NAME ON ANY PAGE BUT THIS PAGE. This includes identifiers and literals. Doing so will incur a 2 point penalty.

  – Keep your eyes on your own paper and do your best to prevent anyone else from seeing your work.

  – Do NOT communicate with anyone other than the professor/proctor for ANY reason in ANY language in ANY manner.

  – This exam is closed notes, closed books, and no calculator.

  – Turn all mobile devices off and put them away now. You cannot have them on your desk.

  – Write neatly and clearly indicate your answers. What I cannot read, I will assume to be incorrect.

  – Stop writing when told to do so at the end of the exam. I will take 5 points off your exam if you do not.

  – Academic misconduct will not be tolerated. Suspected academic misconduct will be immediately referred to the Emory Honor Council. Penalties for misconduct will be a zero on this exam, an F grade in the course, and/or other disciplinary action that may be applied by the Emory Honor Council.

• **TIME:** This exam has 6 questions on 9 pages including the title page. Please check to make sure all pages are included. You will have 50 minutes to complete this exam.

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*I commit to uphold the ideals of honor and integrity by refusing to betray the trust bestowed upon me as a member of the Emory community. I have also read and understand the requirements and policies outlined above.*

Signature: __________________________

<table>
<thead>
<tr>
<th>Question</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>Total</th>
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</thead>
<tbody>
<tr>
<td>Points</td>
<td>12</td>
<td>13</td>
<td>7</td>
<td>7</td>
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<td>6</td>
<td>50</td>
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</tbody>
</table>

1
1. (12 points) Give a Java code example of each of the following. You do not need to write a class or main method, but declare and initialize variables as needed. If you need to add a sentence to clarify your example, use an in-line comment. Be brief.

Note: solutions which contained no code and only consisted of definitions received half credit, at most.

(a) concatenation

Solution: "Hi" + " there!" or similar. Using String with a non-string is fine, as is using variables instead of literals.

(b) casting

Solution: Ex: int x = (int) 4.5; or similar. This must involve something along the lines of (type) value – conversions are not accepted.

(c) safe type conversion

Solution:
int x = 5;
double y = x;

Safe type conversion involves storing a value of one type in a variable of another type. Casting is not safe type conversion.

(d) float literal

Solution: 10.0f or similar. Must have f or F in the literal.

(e) infinite loop

Solution: while(true); or similar.

(f) block comment

Solution: /* This is a block comment. */
2. (13 points) Evaluate each expression. Then give the result of the evaluation and the data type of the result. If the expression cannot be evaluated or is not proper Java syntax, you may simply write “error” for the value, and leave type blank. Assume these expressions are not full statements, and that their execution is independent of each other (the variable values do not change). The first row has been done for you.

```java
String strK = "kiwi", strB = "birds", str2 = "2.6";
char charP = ‘+’;
short shortF = 2;
int intX = -10, intY = 3, intZ = 2;
double doubA = 5.5, doubB = 1.6;
```

<table>
<thead>
<tr>
<th>Expression</th>
<th>Value</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>4+1</td>
<td>5</td>
<td>int</td>
</tr>
<tr>
<td>intY + shortF</td>
<td>5</td>
<td>int</td>
</tr>
<tr>
<td>intX/intY &lt; -3</td>
<td>false</td>
<td>boolean</td>
</tr>
<tr>
<td>intY - intZ + strK</td>
<td>&quot;1kiwi&quot;</td>
<td>String</td>
</tr>
<tr>
<td>str2 + (doubB + intX)</td>
<td>&quot;2.6-8.4&quot;</td>
<td>String</td>
</tr>
<tr>
<td>doubA * intZ / intY</td>
<td>3.66666...</td>
<td>double</td>
</tr>
<tr>
<td>doubB--</td>
<td>1.6</td>
<td>double</td>
</tr>
<tr>
<td>str2 + charP + intY * intZ</td>
<td>&quot;2.6+6&quot;</td>
<td>String</td>
</tr>
<tr>
<td>intZ * (int) doubB + intZ</td>
<td>4</td>
<td>int</td>
</tr>
<tr>
<td>(intY &gt; intZ)</td>
<td></td>
<td>(intX = doubB)</td>
</tr>
<tr>
<td>intX%3</td>
<td>-1</td>
<td>int</td>
</tr>
<tr>
<td>(doubA &lt;= intY) ~ (intZ &gt; 0)</td>
<td>true</td>
<td>boolean</td>
</tr>
<tr>
<td>intX / intZ + intY</td>
<td>-2</td>
<td>int</td>
</tr>
<tr>
<td>shortF + intY % intZ*2</td>
<td>4</td>
<td>int</td>
</tr>
</tbody>
</table>

Scoring: half point per correct value or type.
3. (7 points) Assume the statements below are part of a Java program which compiles and runs. What is the output if the user inputs 15? **Format your answer exactly.**

Write your answer on this side of the page.

```java
Scanner input = new Scanner(System.in);
int number = input.nextInt();

System.out.println("Spring schedule:");
if (number % 6 == 3){
    System.out.println("CS for Business");
} else if (number % 5 == 0){
    System.out.println("Directed Study");
} if (number > 10){
    System.out.println("Linear Algebra");
} else {
    System.out.println("Multivar. Calc");
}

System.out.println("\nSummer schedule:");
if(number > 5){
    if((number < 20) ^ (number%2 == 1)){
        System.out.println("Internship");
    } else if (number > 15){
        System.out.println("REU");
    }
} else {
    if(number%5 == 0){
        System.out.println("Classes");
    } else {
        System.out.println("Job");
    }
}

System.out.println("\nFall schedule:");
System.out.println("Intro to CS II");
if(number <= 5){
    System.out.println("Numerical Analysis");
} else {
    System.out.println("Diff. Equations");
}
```
Solution:

Spring schedule:
CS for Business
Linear Algebra

Summer schedule:

Fall schedule:
Intro to CS II
Diff. Equations

Scoring: Half point per correct inclusion OR omission of a line printed.
4. For each of the code fragments below, give the output. If the code results in an infinite loop, write the first few outputs, and then indicate that it is an infinite loop.

**Scoring:** in general, half point per correct line (or piece for the while loop) of output, even in other, incorrect lines of output. Some points removed for indicating infinite loop.

(a) (2 points)
```java
for(int iter = 10; iter > 0; iter -= 2){
    System.out.println("Iteration " + (--iter));
}
```

**Solution:**
Iteration 9
Iteration 6
Iteration 3
Iteration 0
-1 for indicating infinite loop

(b) (3 points)
```java
String str = "";
int x = 5;
while(x != 1){
    str += x + ", ";
    if(x%2 == 0){
        x /= 2;
    } else {
        x = x*3 + 1;
    }
}
str += x;
System.out.println(str);
```

**Solution:** 5, 16, 8, 4, 2, 1
-1 for indicating infinite loop
(c) (2 points)

```java
int x = -1, y = 4;
do{
    x += y;
    y -= 3;
    System.out.println("x is " + x);
} while(x > 0);
```

Solution:

```
x is 3
x is 4
x is 2
x is -3
-0.5 for indicating infinite loop
```
5. (5 points) Complete the program below. It should repeatedly prompt a user for an integer corresponding to an ASCII value from a user, read in that number, and print out the corresponding character. When the user enters a negative number, the program should terminate and not print out the corresponding character. You can assume valid input (in the range of ASCII values or negative). A sample run is shown below:

Enter an integer ASCII number: 65
A
Enter an integer ASCII number: 97
a
Enter an integer ASCII number: -1

Program begins below:
import java.util.Scanner;

class Ascii{
    public static void main(String[] args){
        Scanner input = new Scanner(System.in);
        /* --------- Write your code below this line ----------- */

        int value;
        do{
            System.out.print("Enter an ASCII integer number: ");
            value = input.nextInt();
            if(value >= 0){
                System.out.println((char) value);
            }
        } while (value > 0);
        /* --------- Write your code above this line ------------ */
    }
}

Solution:

int value;
    do{
        System.out.print("Enter an ASCII integer number: ");
        value = input.nextInt();
        if(value >= 0){
            System.out.println((char) value);
        }
    } while (value > 0);

    /* -------- Write your code above this line ----------- */
}
6. (6 points) Complete the program below. It should prompt a user and take user input for the day of week. If the user inputs "Saturday", the program should print "It’s the weekend! Yay!". If the user inputs "Sunday", the program should print "It’s the weekend, but I have this homework...". If the user inputs anything else, the program should print "Weekday. Work time.". (All output should exclude "s.")

```java
import java.util.Scanner;

public class DayOfWeek{
    public static void main(String[] args){
        Scanner input = new Scanner(System.in);
        /* --------- Write your code below this line ----------- */
        Solution:
        System.out.print("Enter a day of the week: ");
        String day = input.next();

        switch(day){
            case "Saturday":
                System.out.println("It’s the weekend! Yay!");
                break;

            case "Sunday":
                System.out.println("It’s the weekend, but I have" + " this homework...");
                break;

            default:
                System.out.println("Weekday. Work time.");
        }
        /* --------- Write your code above this line ------------ */
    }
}
```