• **INSTRUCTIONS:**

  - 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 I have to tell you multiple times.
  - 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 8 questions on 10 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>
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<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
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<tbody>
<tr>
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1
1. (10 points) Define the terms below. You do not need to give a formal definition just a good description. You may include an example if it is helpful to your answer.

(a) compiler

(b) variable

(c) safe conversion

(d) infinite loop

(e) escape character
2. (6 points) Convert the following binary numbers to decimal equivalents
   (a) $10101_2$
      
      (a) __________

   (b) $1011_2$
      
      (b) __________

3. (6 points) Convert the following decimal number to their binary representation.
   (a) 17
      
      (a) __________

   (b) 45
      
      (b) __________
4. (32 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 write “error” followed by the reason. The first row has been done for you.

```java
String s1 = "Java", s2 = "Computer", s3 = "-42";
char c1 = '5', c2 = '*';
int i1 = -5, i2 = 2, i3 = 6;
double d1 = 4.5, d2 = 9.0;
```

<table>
<thead>
<tr>
<th>Expression</th>
<th>Value (Type)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4+1</td>
<td>5 (int)</td>
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<tr>
<td>i1 + i2 / i2</td>
<td></td>
</tr>
<tr>
<td>s1 + i1 * i3</td>
<td></td>
</tr>
<tr>
<td>i1 * d2</td>
<td></td>
</tr>
<tr>
<td>(int)d2 + d1 + i3</td>
<td></td>
</tr>
<tr>
<td>i2 != d2 / d1</td>
<td></td>
</tr>
<tr>
<td>(int)s3 + i2</td>
<td></td>
</tr>
<tr>
<td>i2 % i3</td>
<td></td>
</tr>
<tr>
<td>d1 / i1 + i2</td>
<td></td>
</tr>
<tr>
<td>&quot;&quot; + i3 + c2 + i1</td>
<td></td>
</tr>
<tr>
<td>i1 + s3 + d2</td>
<td></td>
</tr>
<tr>
<td>c1 + 2</td>
<td></td>
</tr>
<tr>
<td>s1.charAt(5)</td>
<td></td>
</tr>
<tr>
<td>s2.charAt(5)</td>
<td></td>
</tr>
<tr>
<td>!(d1 = d2/i2)</td>
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</tr>
<tr>
<td>d1 &lt; i2*i3</td>
<td></td>
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<tr>
<td>i1++ + ++i1</td>
<td></td>
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</table>
5. For each of the code fragments below, give the output. If there is no output generated, you may write “none”. If the code results in an infinite loop, write the first few outputs, and then indicate that it is an infinite loop.

(a) (2 points)
```java
int x = 1, y = 2, z;
if (x < y) {
    z = x;
    x = y;
    y = z;
}
System.out.println(x);
System.out.println(y);
```

(b) (3 points)
```java
int x = 3, y = -2, z = 1;
z += x++ - --y;
System.out.println(x);
System.out.println(y);
System.out.println(z);
```

(c) (2 points)
```java
char a = 'C';
switch(a){
    case 'A': System.out.println(a + 1); break;
    case 'B': System.out.println(a); break;
    default: System.out.println(a - 1); break;
}
```
(d) (2 points)
String s1 = "Emory", s2 = "University";
if (s1.charAt(0) <= s2.charAt(0))
    System.out.println(s1.substring(2, s1.length()));
else
    System.out.println(s2.substring(2, s2.length()));

(e) (3 points)
int x = 5;
while (x != 0) {
    System.out.println(x);
    x -= 2;
}

(f) (4 points)
for (int x = 2; x <= 11; x++) {
    if (x % 2 == 1)
        continue;
    if (x >= 9)
        break;
    System.out.println(x);
}
6. Read the following snippet of code and answer the questions below.

```java
String s = "acbadca";
int i;
for (i = 0; i < s.length() / 2; i++) {
    if (s.charAt(i) != s.charAt(s.length() - 1 - i))
        break;
}
if (i == s.length() / 2)
    System.out.println("Yes");
else
    System.out.println("No");
```

(a) (3 points) What’s the output?

(b) (3 points) Change exactly one character in `s` to make the output different. Write down the changed string `s`.

(c) (3 points) [bonus] Can you find the pattern of string `s` that makes the output “Yes”?
7. (12 points) Complete the program below. It should prompt the user to enter 50 integer numbers, and print the largest number to the screen. Assume the input numbers are non-negative.

```java
import java.util.Scanner;

public class PrintMax{
    public static void main (String[] args){
        Scanner in = new Scanner(System.in);
        /*----------- Your code here -------------*/
    }
}
```
8. (12 points) Complete the program below. It should prompt the user to enter three edges for a triangle and determine 1) whether the input is valid (the input is valid when it can form a triangle); 2) whether the triangle is a right triangle when the input is valid. Then it prints the conclusion to the screen. Note that the sum of any two edges must be greater than the third edge in a triangle and that the square of the longest edge equals to the square sum of other two edges in a right triangle.

Sample output:

```java
>>> java Triangle
Please input the edges: 1 2 3
Invalid input.

>> java Triangle
Please input the edges: 1 1 1
Triangle.

>> java Triangle
Please input the edges: 3 4 5
Right triangle.
```

```java
import java.util.Scanner;

public class Triangle {
    public static void main(String[] args) {
        int a, b, c; // variables to store the three edges.
        Scanner in = new Scanner(System.in);
        System.out.print("Please input the edges: ");
        /* ---------------- Your code here ----------------*/
    }
}
```
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