

**Instructions.** This exam has six (6) questions worth a total of one hundred (100) points. You have eighty (80) minutes.

This exam is preprocessed by computer. Write neatly, legibly and darkly. If you use a pencil, write darkly. Put all answers (and nothing else) inside the designated boxes. Fill in bubbles and checkboxes completely: ● and ■ (not ✓ or ✕). To change an answer, erase it completely and redo.

**Resources.** The exam is closed book, except that you are allowed to use a single one-sided reference sheet (8.5-by-11 paper, one-sided, in your own handwriting). No electronic devices are permitted.

**Honor Code.** This exam is governed by Princeton's Honor Code. Discussing the contents of this exam before solutions have been posted is a violation of the Honor Code.

NAME:

Solutions

NETID

PRECEPT

- |                       |                       |                       |                       |                       |                       |                       |                       |
|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| P01                   | P02                   | P02A                  | P03                   | P04                   | P05                   | P06                   | P07                   |
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| P08                   | P08A                  | P10                   | P11                   | P12                   | P13                   | P14                   | P15                   |
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EXAM ROOM

- McCosh 50     McCosh 10     McCosh 62     OTHER \_\_\_\_\_

*"I pledge my honor that I will not violate the Honor Code during this examination."*

\_\_\_\_\_  
**Signature**

Give the value and type of each of the following expressions. To express a value, write a Java literal of the appropriate type, such as `0` (for an `int`), `3.14` (for a `double`), `false` (for a `boolean`), `"tiger"` (for a `String`), `'a'` (for a `char`). If the expression does not compile or causes a runtime exception, put an `X` in both boxes.

Expression	Value	Type
<code>8 / 10 * 1.5</code>	<code>0.0</code>	<code>double</code>
<code>12 % 7</code>	<code>5</code>	<code>int</code>
<code>2 + 3 * 4</code>	<code>14</code>	<code>int</code>
<code>2 + 3.0 * 4</code>	<code>14.0</code>	<code>double</code>
<code>8 - (int) "2.0"</code>	<code>X</code>	<code>X</code>
<code>1 / 1 / 0</code>	<code>X</code>	<code>X</code>
<code>1.0 / 1 / 0</code>	<code>Infinity</code>	<code>double</code>
<code>true    false &amp;&amp; true</code>	<code>true</code>	<code>boolean</code>
<code>true &amp;&amp; !(0 &lt; -5)</code>	<code>true</code>	<code>boolean</code>
<code>(!!false    !!true)</code>	<code>true</code>	<code>boolean</code>
<code>1 &lt; 2 &lt; 3</code>	<code>X</code>	<code>X</code>
<code>Math.max(1.0, 2.0, 3.0)</code>	<code>X</code>	<code>X</code>

```
1 public class BuggyCode {
2     // Prints the absolute value of the sum of all even elements
3     public static void main(String[] args) {
4         int N = args[0];
5         int sum;
6         for (i = 0; i < N; i++) {
7             int val = StdIn.readInt();
8             if (val % 2)
9                 sum += val;
10        }
11        if (N < 0)
12            StdOut.println(-sum);
13        else
14            StdOut.println(sum);
15    }
16 }
```

The compiler reports an error on lines 4, 6, and 8 for the **BuggyCode** class. Fix them by writing each line corrected in the natural way. Write your answer in the boxes below:

Line 4:

**int N = Integer.parseInt(args[0]);**

Line 6:

**for (int i = 0; i < N; i++) {**

Line 8:

**if (val % 2 == 0)**

After fixing these errors, the compiler reports a **variable might not have been initialized** error on lines 9, 12, and 14. Fill in the bubbles corresponding to the line(s) would you change to fix this error?

1



2



3



4



5



6



7



8



9



10



11



12



13



14



15



16



```

public class Scatmain {
    public static void main(String[] args) {
        String[] x = { "Ski-", "Bwi-", "Ba-", "Bop-", "Dop-", "Bop\n", "Yeah!\n", "Bada-" };
        int[] y = { 0, 2, 3, 2, 4, 5, -1, x.length - 2 };
        String z = x[2] + x[2] + x[x.length - 1] + "Dop";
        for (int i = 0; i < x.length; i++) {
            if (y[i] < 0) {
                StdOut.print(x[7] + x[y[1] - 1]);
                for (int j = 0; j < 3; j++)
                    StdOut.println(z);
            }
            else
                StdOut.print(x[y[i]]);
        }
    }
}

```

This program produces between 1 and 7 lines of output. What does it print? Write the letter corresponding to each line's text in the box. Use only one letter per box. Every box needs a letter. You may use each letter once, multiple times, or not at all.

Line 1:

**H**

A &lt;blank&gt; or not a line the program prints.

Line 2:

**K**B **Bwi-Bwi-Bada-Dop**

Line 3:

**C**C **Ba-Ba-Bada-Dop**

Line 4:

**C**D **Yeah!**

Line 5:

**D**E **Ba-Ba-Yeah!**

Line 6:

**A**F **Dop**G **Bwi-Bwi-Yeah!**

Line 7:

**A**H **Ski-Ba-Bop-Ba-Dop-Bop**I **Bop**J **Bada-Bwi**K **Bada-Bwi-Ba-Ba-Bada-Dop**L **Ski-Bwi-Ba-Bwi-Bop-Dop**M **I'm the Scatman!**

Consider the following code fragment. The labeled dotted boxes represent regions where additional code exists.

```

1.  public static void func(int i) {
      A
2.  int j = i;
      B
    }
    public static void main(String[] args) {
      C
3.  for (int i = 0; i < n; i++) {
      D
4.  for (int j = 0; i < n; i++) {
      E
      func(j);
      F
    }
      G
    }
    H
  }

```

What is the valid scope for variable **i** in line number 1? Select the regions that apply.

A	B	C	D	E	F	G	H
<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

What is the valid scope for variable **j** in line number 2? Select the regions that apply.

A	B	C	D	E	F	G	H
<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

What is the valid scope for variable **i** in line number 3? Select the regions that apply.

A	B	C	D	E	F	G	H
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>

What is the valid scope for variable **j** in line number 4? Select the regions that apply.

A	B	C	D	E	F	G	H
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>

1. Express the decimal number **6** as 8-bit two's complement:

**00000110**

2. Express the decimal number **-9** as 8-bit two's complement:

**11110111**

3. Convert **FACE** from hexadecimal to binary:

**1111101011001110**

4. Convert **10110000** from 8-bit two's complement to decimal:

**-80**

5. Convert **294** from decimal to hexadecimal:

**126**

In this question, if you are not sure of an answer, select "Not Sure" to receive 1 point. Consider the following recursive function:

```
public static void mystery(int n, double x, double y, double size) {
    if (n <= 0) return;
    StdDraw.filledSquare(x, y, size / 6);
    double newSize = size / 3;
    mystery(n - 1, x - newSize, y, newSize);
    mystery(n - 1, x + newSize, y, newSize);
    mystery(n - 2, x, y + newSize, newSize);
}
```

What results from calling `mystery(0, 0.5, 0.5, 1)`? Select letter of image below, blank image, or other.

A	B	C	D	E	F	Blank	Other	Not Sure
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>

What results from calling `mystery(3, 0.5, 0.5, 1)`? Select letter of image below, blank image, or other.

A	B	C	D	E	F	Blank	Other	Not Sure
<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

What results from calling `mystery(4, 0.5, 0.5, 1)`? Select letter of image below, blank image, or other.

A	B	C	D	E	F	Blank	Other	Not Sure
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

