

# CS 312 Exam 1 – Fall 2023 - SOLUTIONS

**EXPRESSIONS - 1 each, 12 total**

<b>Correct Answers</b>	<b>Points</b>
1) 7 2) 12 3) 6.25 4) "14!!83" 5) "802" 6) -2 7) 6.0 8) 65536.0 9) 21.5 10) 33.3 11) "hael b. jordanc" 12) 19	-1 wrong value -0.5 wrong type

**CODE TRACING - 2 points each, 24 total**

<p>Question 1: 32 13</p> <p>Question 2: 1.0 21</p> <p>Question 3: Horns3UT12.0 5.0</p> <p>Question 4: *****</p> <p>Question 5: 3</p> <p>Question 6: 51 asterisks</p> <p>Question 7: 46 asterisks</p> <p>Question 8: ***~***#~***#~***#~***#</p> <p>Question 9: -2 2 2 -1 -1 2</p> <p>Question 10: 17.0 5.5 5</p> <p>Question 11: 15</p> <p>Question 12: -12 2 -11 3</p>	<p>1 point partial credit 2 points full credit</p>
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## Program #1 Fibonacci Sequence - 16 points

```

9 // print first N values in Fibonacci sequence
10 public static void printFibs(int n) {
11     // set initial values given first two numbers, 0 and 1
12     int newFib;
13     int lastNum = 1;
14     int lastLastNum = 0;
15     System.out.print("0 1 ");
16     // loop once for each number in sequence
17     for (int i = 2; i <= n; i++) {
18         newFib = lastNum + lastLastNum;
19         System.out.print(newFib + " ");
20         // use variables to hold onto the last two values in the sequence
21         lastLastNum = lastNum;
22         lastNum = newFib;
23     }
24 }

```

Item	Line #s	Category	Points
A	10	method header	+2 correct header (not parameter) +2 correct parameter
B	13-14	handle 0 and 1	+2 setup method to "track" previous numbers +2 print the 0 and 1 correctly
C	17	for loop	+4 execute the correct number of times (n - 1)
D	18-22	print sequence	+2 calculate and print next number in sequence +2 updates previous numbers
X	N/A	Instructions	MAX of -5 -2 Unnecessary code -2 Redundant or inefficient code -2 Seriously incorrect style guide issue -2 Java syntax not allowed -2-4 Not following instructions (if not reflected above already)

## Program #2 - Print Digit Tree - 16 points

```
10 // print a digit tree for a given integer
11 public static void printDigitTree1(int num) {
12     String strNum = num + "";
13     // loop once per line
14     for (int i = strNum.length() - 1; i >= 0; i--) {
15         // loop once per digit
16         for (int j = 0; j < i + 1; j++) {
17             System.out.print(strNum.charAt(i));
18         }
19         System.out.println();
20     }
21 }
```

Main() is provided.

Item	Line #s	Category	Points
A	11	method header	+2 correct parameter +2 correct method header (not parameter)
B	12	convert in to String	+2 convert int to string
C	14	loop per line	+4 loop once per line (count = length of string) +2 loop once per character, adjusted based on i +2 print the correct character +2 at one println() in correct place
X	N/A	Instructions	MAX of -5 -2 Unnecessary code -2 Redundant or inefficient code -2 Seriously incorrect style guide issue -2 Java syntax not allowed -2-4 Not following instructions (if not reflected above already)

## Program #3 Slash Figure - 16 points

```

3 public class SlashFigure {
4
5     public static final int SIZE = 5;
6
7     public static void main(String[] args) {
8         // loop once for each line
9         for (int line = 1; line <= SIZE; line++) {
10            printChars(" ", (line - 1));
11            printChars("\\", (line - 1) * 2);
12            printChars("-", (SIZE - line) * 3);
13            System.out.print("||");
14            printChars("-", (SIZE - line) * 3);
15            printChars("/", (line - 1) * 2);
16            System.out.println();
17        }
18    } // end of main
19
20    // method to print given string a given number of times on one line
21    private static void printChars(String chars, int count) {
22        // loop once per string
23        for (int i = 1; i <= count; i++) {
24            System.out.print(chars);
25        }
26    }
27 }

```

Lines 3-7 and 20-27 given in starter code.

Item	Line #s	Category	Points
A	9	for loop	+4 loop executes SIZE times
B	10-16	print parts of line	+2 prints correct # spaces +2 prints correct # backslashes and forward slashes +2 prints correct # dashes +2 prints all above in correct order, including pipelines +4 use printChars()
X	N/A	Instructions	MAX of -5 -2 Unnecessary code -2 Redundant or inefficient code -2 Seriously incorrect style guide issue -2 Java syntax not allowed -2-4 Not following instructions (if not reflected above already)

## Program #4 Reverse Digits - 16 points

```

12 // Solution
13 public static int reverseDigits(int num) {
14     int newNum = 0;
15
16     // find number of digits in an integer using log
17     int numDigits = (int) (Math.log10(num) + 1);
18
19     for (int i = 0; i < numDigits; i++) {
20         newNum = newNum * 10 + num % 10;
21         // option 2
22         // newNum += (num % 10) * (int) Math.pow(10, i);
23         // option 3
24         // newNum += (num % 10) * multiplier; // works
25         // multiplier *= 10; // this initialized to 0 outside loop
26         num = num / 10;
27     }
28     return newNum;
29 }

```

Main() is provided.

Item	Line #s	Category	Points
A	11	method header	+2 correct return type +2 correct parameter
B	17-26	get reverse	+2 loop executes correct number of times +4 separate each digit +4 accumulate new value
C	28	return	+2 correct return statement
X	N/A	Instructions	MAX of -5 -2 Unnecessary code -2 Redundant or inefficient code -2 Seriously incorrect style guide issue -2 Java syntax not allowed -2-4 Not following instructions (if not reflected above already)