

Building Java Programs

Chapter 2 Lab Handout

Expressions

1. Compute the value of each expression below. Be sure to list a literal of appropriate type (e.g., 7.0 rather than 7 for a double, string literals in quotes).

Expression

$4 * 3/8 + 2.5 * 2$

$26 \% 10 \% 4 * 3$

$(5 * 7.0/2 - 2.5)/5 * 2$

$12/7 * 4.4 * 2/4$

"hello 34 " + 2 * 4

"2 + 2 " + 3 + 4

3 + 4 + " 2 + 2"

$41 \% 7 * 3/5 + 5/2 * 2.5$

$22 + 4 * 2$

$10.0/2/4$

$23 \% 8 \% 3$

$17 \% 10/4$

$8/5 + 13/2/3.0$

$12 - 2 - 3$

$6/2 + 7/3$

$6 * 7\%4$

Expression

$(2.5 + 3.5)/2$

$9/4 * 2.0 - 5/4$

$3 * 4 + 2 * 3$

$177 \% 100 \% 10/2$

$9/2.0 + 7/3 - 3.0/2$

$813 \% 100/3 + 2.4$

$27/2/2.0 * (4.3 + 1.7) - 8/3$

$89 \% (5 + 5) \% 5$

$4.0/2 * 9/2$

$392/10 \% 10/2$

$53/5/(0.6 + 1.4)/2 + 13/2$

$8 * 2 - 7/4$

$37 \% 20 \% 3 * 4$

$2.5 * 2 + 8/5.0 + 10/3$

$2 * 3/4 * 2/4.0 + 4.5 - 1$

$89 \% 10/4 * 2.0/5 + (1.5 + 1.0/2) * 2$

Variables

2. What is the output from the following code?

```
int max;  
int min = 10;  
max = 17 - 4 / 10;  
max = max + 6;  
min = max - min;  
System.out.println(max * 2);  
System.out.println(max + min);  
System.out.println(max);  
System.out.println(min);
```

3. What are the values of the variables a, b, and c after the following code? (What is the code really doing?)

```
int a = 3;  
int b = 7;  
int c = 9;  
a = a * b * c;  
b = a / b / c;  
c = a / b / c;  
a = a / b / c;
```

for Loops

4. Assume that you have a variable called `count` that will take on the values 1, 2, 3, 4, and so on. You are going to formulate expressions in terms of `count` that will yield different sequences. For example, to get the sequence 2, 4, 6, 8, 10, 12, ..., you would use the expression $(2 * \text{count})$. Fill in the table below, indicating an expression that will generate each sequence.

Sequence	Expression
4, 19, 34, 49, 64, 79, ...	
30, 20, 10, 0, -10, -20, ...	
-7, -3, 1, 5, 9, 13, ...	
97, 94, 91, 88, 85, 82, ...	

Nested for Loops

5. What output is produced by the following program?

```
public class Loops {
    public static void main(String[] args) {
        for (int i = 1; i <= 10; i++) {
            for (int j = 1; j <= 10 - i; j++) {
                System.out.print(" ");
            }
            for (int j = 1; j <= 2 * i - 1; j++) {
                System.out.print("*");
            }
            System.out.println();
        }
    }
}
```

6. Write a static method named `drawFigure` that produces the following output. Use `for` loops to capture the structure of the figure.

```
////////////////\////////////////////////////////
////////////////*****\////////////////////////////////
////////////////*****\////////////////////////////////
////////////////*****\////////////////////////////////
*****
```

7. Modify your method from the previous exercise so that it uses a class constant for the figure's size. The previous output used a constant size of 5. Here is the output for a constant size of 3:

```
////////\\\\\\\\\\\
//////*****\\
*****
```

Chapter 2 Lab Handout Solutions

1.

Expression	Value	Expression	Value
$4 * 3/8 + 2.5 * 2$	6.0	$(2.5 + 3.5)/2$	3.0
$26 \% 10 \% 4 * 3$	6	$9/4 * 2.0 - 5/4$	3.0
$(5 * 7.0/2 - 2.5)/5 * 2$	6.0	$3 * 4 + 2 * 3$	18
$12/7 * 4.4 * 2/4$	2.2	$177 \% 100 \% 10/2$	3
"hello 34 " + 2 * 4	"hello 34 8"	$9/2.0 + 7/3 - 3.0/2$	5.0
"2 + 2 " + 3 + 4	"2 + 2 34"	$813 \% 100/3 + 2.4$	6.4
$3 + 4 + " 2 + 2"$	"7 2 + 2"	$27/2/2.0 * (4.3 + 1.7) - 8/3$	37.0
$41 \% 7 * 3/5 + 5/2 * 2.5$	8.0	$89 \% (5 + 5) \% 5$	4
$22 + 4 * 2$	30	$4.0/2 * 9/2$	9.0
$10.0/2/4$	1.25	$392/10 \% 10/2$	4
$23 \% 8 \% 3$	1	$53/5/(0.6 + 1.4)/2 + 13/2$	8.5
$17 \% 10/4$	1	$8 * 2 - 7/4$	15
$8/5 + 13/2/3.0$	3.0	$37 \% 20 \% 3 * 4$	8
$12 - 2 - 3$	7	$2.5 * 2 + 8/5.0 + 10/3$	9.6
$6/2 + 7/3$	5	$2 * 3/4 * 2/4.0 + 4.5 - 1$	4.0
$6 * 7\%4$	2	$89 \% 10/4 * 2.0/5 +$ $(1.5 + 1.0/2) * 2$	4.8

2.

46
36
23
13

3.

a has value 9

b has value 3

c has value 7

(The code is rotating the values of the three variables.)

4.

Sequence	Expression
4, 19, 34, 49, 64, 79, ...	$15 * \text{count} - 11$
30, 20, 10, 0, -10, -20, ...	$40 - 10 * \text{count}$
-7, -3, 1, 5, 9, 13, ...	$4 * \text{count} - 11$
97, 94, 91, 88, 85, 82, ...	$100 - 3 * \text{count}$

5.

```

*
***
*****
*****
*****
*****
*****
*****
*****
*****
*****
*****
*****
*****
*****

```

6.

```
public static void drawFigure() {
    for (int line = 1; line <= 5; line++) {
        for (int i = 1; i <= -4 * line + 20; i++) {
            System.out.print("/");
        }
        for (int i = 1; i <= 8 * line - 8; i++) {
            System.out.print("*");
        }
        for (int i = 1; i <= -4 * line + 20; i++) {
            System.out.print("\\");
        }
        System.out.println();
    }
}
```

7.

```
public static final int SIZE = 5;

public static void drawFigure() {
    for (int line = 1; line <= SIZE; line++) {
        for (int i = 1; i <= -4 * line + 4 * SIZE; i++) {
            System.out.print("/");
        }
        for (int i = 1; i <= 8 * line - 8; i++) {
            System.out.print("*");
        }
        for (int i = 1; i <= -4 * line + 4 * SIZE; i++) {
            System.out.print("\\");
        }
        System.out.println();
    }
}
```