PKG 12: METHODS 04 and MATHEMATICAL FUNCTIONS

PKG 11, METHODS 03, on File Manager: http://csc210.ducta.net/WEEK-05/PKG11_Method03.jpg

```
public class SaySomething {

    public static void main(String[] args) {

        // Method basic
        saySomething("Midterm Exam 1 is next week!");

        // Methods because they are reusable
        saySomething("Let's ace it!");


        // Methods and loops
        System.out.println("\nAgain, in loop!");
        for (int controlVariable = 0; controlVariable < 3; controlVariable++) {
            saySomething("Value of controlVariable: " + controlVariable);
        }


        // Methods, loops, and 1D arrays. Shorthand notation / the array initializer.
        String[] counts = {"One", "Two", "Three"};
        for (int index = 0; index < counts.length; index++) {
            saySomething(counts[index]);
        }


        // Methods, loops, and 1D arrays. Declare, create, and initialize.
        String[] messages = new String[3];
        messages[0] = "Hi";
        messages[1] = "Howdy";
        messages[2] = "Bye";

        for (int index = 0; index < messages.length; index++) {
            saySomething(messages[index]);
        }


    }

    // A void method that says a message
    private static void saySomething(String message) {
        System.out.println(message);
    }
}
```

```
Midterm Exam 1 is next week!
```

```
Let's ace it!
```

```
Again, in loop!
Value of controlVariable: 0
Value of controlVariable: 1
Value of controlVariable: 2
```

```
One
Two
Three
```

```
Hi
Howdy
Bye
```

```
64  METHODS 04 and MATHEMATICAL FUNCTIONS
65
66  Class Math: https://docs.oracle.com/en/java/javase/12/docs/api/java.base/java/lang/Math.html
67
68  The class Math contains methods for performing basic numeric operations such as the
69  elementary exponential, logarithm, square root, and trigonometric functions.
70
71  public class MathMethods {
72
73      public static void main(String[] args) {
74
75          System.out.println( Math.ceil(2.1) );    //   3.0
76          System.out.println( Math.ceil(2.0) );    //   2.0
77          System.out.println( Math.ceil(-2.0) );   // - 2.0
78          System.out.println( Math.ceil(-2.1) );   // - 2.0
79
80          System.out.println( Math.floor(2.1) );   //   2.0
81          System.out.println( Math.floor(2.0) );   //   2.0
82          System.out.println( Math.floor(-2.0) );  // - 2.0
83          System.out.println( Math.floor(-2.1) );  // - 3.0
84
85          System.out.println( Math.rint(2.1) );    //   2.0
86          System.out.println( Math.rint(-2.0) );   // - 2.0
87          System.out.println( Math.rint(-2.1) );   // - 2.0
88          System.out.println( Math.rint(2.5) );    //   2.0
89          System.out.println( Math.rint(4.5) );    //   4.0
90          System.out.println( Math.rint(-2.5) );   // - 2.0
91
92          System.out.println( Math.round(2.6f) );  //   3
93          System.out.println( Math.round(2.0) );   //   2
94          System.out.println( Math.round(-2.0f) ); // - 2
95          System.out.println( Math.round(-2.6) );  // - 3
96          System.out.println( Math.round(-2.4) );  // - 2
97
98          System.out.println( Math.max(2, 3) );    //   3
99          System.out.println( Math.max(2.5, 3) );  //   3.0
100         System.out.println( Math.min(2.5, 4.6) );//   2.5
101
102         System.out.println( Math.abs(-2) );      //   2
103         System.out.println( Math.abs(-2.1) );    //   2.1
104
105         System.out.println( Math.pow(2, 3) );    //   8.0
106         System.out.println( Math.pow(3, 2) );    //   9.0
107
108         System.out.println( Math.sqrt(4) );      //   2.0
109         System.out.println( Math.sqrt(16) );     //   4.0
110
111         System.out.println( Math.sin(0) );       //   0.0
112         System.out.println( Math.cos(0) );       //   1.0
113
114
115         System.out.println( (int)(Math.random() * 10) );
116                                                  // A radom integer between 0 and 9
117         System.out.println( 50 + (int)(Math.random() * 50) );
118                                                  // A radom integer between 50 and 99
119
120
121         // For more, please see and practice Class Math on Oracle.com, line #66
122
123     }
124 }
125
126
```

1. What is the representation of the third element in an array called a?
a. a[2] b. a(2) c. a[3] d. a(3)

2. If you declare an array double[] list = {3.4, 2.0, 3.5, 5.5}, list[1] is _____.
a. 3.4 b. 2.0 c. 3.5 d. 5.5 e. undefined

3. Which of the following is incorrect?
a. int[] a = new int[2]; b. int a[] = new int[2];
c. int[] a = new int(2); d. int a = new int[2]; e. int a() = new int[2];

4. If you declare an array double[] list = {3.4, 2.0, 3.5, 5.5}, the highest index in array list is _____.
a. 0 b. 1 c. 2 d. 3 e. 4

5. How many elements are in array double[] list = new double[5]?
a. 4 b. 5 c. 6 d. 0

6. What is the correct term for numbers[99]?
a. index b. index variable c. indexed variable d. array variable e. array

7. Suppose int i = 5, which of the following can be used as an index for array double[] t = new double[100]?
a. i b. (int)(Math.random() * 100))
c. i + 10 d. i + 6.5 e. Math.random() * 100

8. Analyze the following code.
```
public class Test {
  public static void main(String[] args) {
    int[] x = new int[3];
    System.out.println("x[0] is " + x[0]);
  }
}
```
a. The program has a compile error because the size of the array wasn't specified when declaring the array.
b. The program has a runtime error because the array elements are not initialized.
c. The program runs fine and displays x[0] is 0.
d. The program has a runtime error because the array element x[0] is not defined.

9. Which of the following statements is valid?
a. int i = new int(30); b. double d[] = new double[30]; c. int[] i = {3, 4, 3, 2};
d. char[] c = new char(); e. char[] c = new char[4]{'a', 'b', 'c', 'd'};

10. How can you initialize an array of two characters to 'a' and 'b'?
a. char[] charArray = new char[2]; charArray = {'a', 'b'};
b. char[2] charArray = {'a', 'b'};
c. char[] charArray = {'a', 'b'};
d. char[] charArray = new char[]{'a', 'b'};

11. Assume int[] t = {1, 2, 3, 4}. What is t.length?
a. 0 b. 3 c. 4 d. 5

12. What is the output of the following code?
```
double[] myList = {1, 5, 5, 5, 5, 1};
double max = myList[0];
int indexOfMax = 0;
for (int i = 1; i < myList.length; i++) {
  if (myList[i] > max) {
    max = myList[i];
    indexOfMax = i;
  }
}
System.out.println(indexOfMax);
```
a. 0 b. 1 c. 2 d. 3 e. 4

13. Suppose int i = 5, which of the following can be used as an index for array double[] t = new double[100]?

a. i
b. (int)(Math.random() * 100))
c. i + 10
d. i + 6.5
e. Math.random() * 100

14. Analyze the following code:

```
public class Test {
  public static void main(String[] args) {
    double[] x = {2.5, 3, 4};
    for (double value: x)
      System.out.print(value + " ");
  }
}
```

a. The program displays 2.5, 3, 4
b. The program displays 2.5 3 4
c. The program displays 2.5 3.0 4.0
d. The program displays 2.5, 3.0 4.0
e. The program has a syntax error because value is undefined.

15. Analyze the following code:

```
public class Test {
  public static void main(String[] args) {
    int[] a = new int[4];
    a[1] = 1;
    a = new int[2];
    System.out.println("a[1] is " + a[1]);
  }
}
```

a. The program has a compile error because new int[2] is assigned to a.
b. The program has a runtime error because a[1] is not initialized.
c. The program displays a[1] is 0.
d. The program displays a[1] is 1.

16. Analyze the following code:

```
public class Test1 {
  public static void main(String[] args) {
    xMethod(new double[]{3, 3});
    xMethod(new double[5]);
    xMethod(new double[3]{1, 2, 3});
  }

  public static void xMethod(double[] a) {
    System.out.println(a.length);
  }
}
```

a. The program has a compile error because xMethod(new double[]{3, 3}) is incorrect.
b. The program has a compile error because xMethod(new double[5]) is incorrect.
c. The program has a compile error because xMethod(new double[3]{1, 2, 3}) is incorrect.
d. The program has a runtime error because a is null.

17. Which of the following is the correct header of the main method?

a. public static void main(String[] args)
b. public static void main(String args[])
c. public static void main(String[] x)
d. public static void main(String x[])
e. static void main(String[] args)