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Class Math	Class String
int/long/double/float **abs** (int/long/double/float x)	int **length**() String **toLowerCase**() String **toUpperCase**() String **concat**(String str)
long **round**(double x) double **ceil**(double x) double **floor**(double x) double **exp**(double x) double **log**(double x) double **log10**(double x) double **sqrt**(double x) double **pow**(double x, double y)	String **replace** (char CharToBeReplaced, char CharReplacedWith)
int/long/double/float **min** (int/long/double/float x, int/long/double/float y) int/long/double/float **max** (int/long/double/float x, int/long/double/float y)	char **charAt**(int index) int **indexOf** (char ch) int **indexOf** (char ch, int pos) int **indexOf** (String str) int **indexOf** (String str, int pos) String **substring** (int beginIndex) String **substring** (int beginIndex, int endIndex)
double **sin**(double x) double **cos**(double x) double **tan**(double x)	boolean **equals** (String str) int **compareTo** (String str)
	Class Character
	boolean **isDigit**(char ch) boolean **isLetter**(char ch) boolean **isLowerCase**(char ch) boolean **isUpperCase**(char ch) char **toLowerCase**(char ch) char **toUpperCase**(char ch)

Question #1: True or false? **[4 pts]**

1. (F) ((while(true) {...})) will always be an infinite loop. unless there is a break inside
2. (F) The while loop cannot be used for counter-controlled loop logic. updates the value inside
3. (T) The for loop heading contains some statements that execute only once. the statement → int i=0, executes once
4. (F) In a void method, the statements ((if(8<9) return; if(9>8) return;)) will cause an error.
5. (T) A formal parameter list specifies the data types and identifiers of method parameters. type of → identifier methodName(int x, int y)
6. (F) Methods must return a single value. if it is a return method only
7. (F) For a class variable to be accessed by a static method, it must be declared as public. static
8. (F) A method can be defined inside another method. method nesting causes a syntax error

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Question #2: MCQ - Choose one correct answer: [4 pts]

1. When code needs to be repeated until a special value is met, that is called…
   a. Counter-controlled loop
   b. Sentinel-controlled loop
   c. Infinite loop
   d. All of the above

2. A loop will end when _____ is reached.
   a. `break;`
   b. `return;`
   c. the closing brace of the final iteration in the loop }
   d. All of the above

3. When a variable of type `int` is sent to a method that has a parameter of type `double`, what will happen?
   a. `int` is immediately converted to `double`
   b. first search for an overloaded method that receives an `int`
   c. syntax error
   d. logical error

4. Which statement allows you to omit the class name and dot operator when calling pre-defined methods.. `import static java.lang.Math.*;`
   a. `import public…`
   b. `import void…`
   c. `import static…`
   d. None of the above

5. Consider a loop that runs 5 times, which contains a nested loop that runs 3 times. When the outer loop terminates, the inner loop body will have run a total of…
   a. 15 times
   b. 8 times
   c. 3 times
   d. Cannot be calculated

6. The body of the loop ((`while(false){...}`)) is executed…
   a. once
   b. never
   c. infinitely
   d. None of the above

7. When a method is invoked in a stand-alone statement, it is most likely of type…
   a. String
   b. void
   c. overloaded
   d. static

8. The `continue` statement cannot be used inside…
   a. `for`
   b. `while`
   c. `switch`
   d. `do while`

Question #3: Coding [8 pts]

1. Assume `theta` is a variable of type `double` and is declared and initialized. Write **one or more statements** to compute the sin of the half angle, knowing that the formula is: $\sin\left(\frac{\theta}{2}\right) = \sqrt{\frac{1-\cos\theta}{2}}$

   declare a variable of a suitable type to store the result and name the variable `sinHalfTheta`

```
double sinHalfTheta= Math.sqrt((1-Math.cos(theta))/2);
```

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2. Write **a method** `containsInFirstHalf` that returns `true` if a certain string contains a specific letter within the first half of the string, and returns `false` otherwise. The method receives a string `str` and a character `letter`.

```
Public static boolean containsInFirstHalf(String sth, Char letter){
boolean contains = false;
sth = sth.substring(0,str.length()/2);
if (sth.indexOf(letter) != -1) // if it exists it will have an index number
contains= true;
return contains;
}
```

3. Assume the method `containsInFirstHalf` is implemented correctly. **Complete the program** `WordCheck` that asks a user to enter a sentence of 10 words. And then outputs the number of words that contain **both** the **letter 'a'** and the **letter 'n'** in its first half. Hello my name is dalal I study software engine

```
import java.util.*;
public class WordCheck
{ static Scanner in = new Scanner(System.in);
  public static void main (String[] args){
    int count = 0;
    System.out.println("Enter 10 words:");
    for(int i=0; i<10; i++){
    String s = in.next();
    if (containsInFirstHalf(s,'a') && containsInFirstHalf(s,'n'))
       count++;
    }//end of loop
    System.out.println("Your sentence has " + count +
    words that contain both 'a' and 'n' in its first half.");
    end main()

  assume containsInFirstHalf is implemented here
  end class
```

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Question #4: Scope [4pts]

```
1  public class checkScope {
2
3      public static double d = 1.75;
4
5      public static void main(String[] args) {
6          int x = 8;
7          System.out.println(plus3(x));
8          System.out.println("Out 1: " + x);
9          System.out.println("Out 2: " + w);
10         x = (int)Math.pow(x,w);
11         System.out.println("Out 3: " + w);
12         System.out.println("Out 4: " + x);
13         funny(d);
14     } // main
15
16     public static void funny(double fun) {
17         fun = fun - 1;
18         String text = "Hi there!";
19         if(fun > 2) {
20             int w = (int) Math.floor(d);
21             System.out.println("floor:" + w);
22             System.out.println(text);
23         }
24         else {
25             int w = (int) Math.round(d);
26             System.out.println("round: " + w);
27         }
28         System.out.println("Surprise: " + w);
29     } // funny
30
31     public static int w = 3;
32
33     public static int plus3 (int w){
34         System.out.println("In plus3:" + w);
35         w += 3;
36         return w;
37     } // plus3
38
39 } // class
```

OUTPUT

In plus3: ~2

5

out 1: ~2

out2: ~3

out3: ~3

out 4: ~8

round: ~2

Surprise: ~3

1. What is the output of the program? (use the output box above)
2. Specify the scope of the following identifiers. Say for example: "in the whole class", or XX except…", or "from line #__ to line# __ and …", etc.
   a. The identifier `args` on line#5

all of ~~main method~~

   b. The identifier `funny` on line#16

Line 3(d), Line 31(w), main method, (Plus3), (Funny) header

   c. The identifier `text` on line#18

Line 18 & Line 19