# 44-542 Object Oriented Programming

# Lab01: Objects Lab Activity

**Objective:** Covers the usage of **String**, **Random**, and **Math** classes and its methods.

**NOTE:**

* For the **String** problems in this lab, use only **String** methods. You do not need to use arrays, split method, or any looping or selection constructs.
* Do not hard code any values unless specified and you must follow the given naming conventions.
* Check the given sample output to understand how the results need to be printed.

1. Create a New Project in NetBeans and name it as **Lastname\_Lab01Objects** where **Lastname** is your last name.
2. Create a new package in the above project created and name it as **objects**.
3. Create a new Java Main Class in the above package and name it, as **StringsAndNumbers.**The@author annotation must contain your full name.
4. Use the same **StringsAndNumbers** class to answer all the below questions.

**Questions**

**// String Class**

1. Inside the Main method do the following:
   1. Declare and initialize the below variables as **String** data types:
      1. **str1** - **Welcome** with 4 leading spaces,
      2. **str2** - **to** with 1 trailing space and 1 leading space**,**
      3. **str3** -**Northwest** with 3 leading spaces and 2 trailing spaces**.**
      4. **str4** – **Missouri** with 1 leading and no trailing spaces.
      5. **str5** - **State** with 1 leading and 3 trailing spaces.
      6. **str6** - **University** with 1 leading and 1 trailing space.

**Note:** Don’t change the Variable names

* 1. Concatenate all the above strings and print the string and length of the concatenated string.
  2. Now, print the above strings as ” **Welcome to Northwest Missouri State University**” with no leading and trailing spaces and one space between each word with an exclamation mark **(“!”)** appended at the end of the sentence and print the length of the string.
  3. Retrieve and print the word **“State University”** from the above-concatenated string 1(c)
  4. Convert all the characters to lowercase from 1(d) and print it.
  5. Print the last index of “e” from 1(e)
  6. Create a string **str7**-**Applied** using new operator. Compare str7 and “Applied” with == and equals method. Print the results and an explanation.
  7. Given the String **"computer Applied science Applied Computer science**

**science applied computer Applied computer Science applied computer**

**Applied"**, write a statement to print the index of the first occurrence of the

word **“applied”**.

1. Print the String “**we learned about honesty and integrity!”** and then print the string again with replaced white space with Underscore. The string looks like “**we\_learned\_about\_honesty\_and\_integrity!**”

(**Hint:** use replaceAll() method from String Class)

1. Print your own answer for the question **“Why do you choose Applied Computer Science”.**

**//Math Class**

1. Methods in the **Math** class are all static methods. Static methods do not require an instance of the class to be invoked. Instead, you use the class name, followed by a dot, followed by the method. Use the Math class to compute these problems. Use various methods in the Math class; refer to the Math class API for more information.
   1. Write statements for below:
      1. Declare two intvariables**,** value1andvalue2,and initialize them with 12 and 6 respectively. Write a statement that computes value1 raised to the power of value2 and print the result.
      2. From trigonometry, using the Math class print secant of value1. Also round the result to two decimals and print it. (Hint:Math.round() method).
      3. Declare a double variable myNumber and initialize it with 37.15. Write a statement that returns the square root of myNumber. Print the ceiling and floor values of myNumber.
      4. Using the Math class, print the value of sin 60° cos 45° + cos 60° sin 45°.

(**Hint:** use sin (A+B) = sinAcosB + cosAsinB formula)

* + 1. What is the theoretical value of tan (90)? Using the Math class, print cubic root of |tan (90)|.
    2. Using the Math class, print the absolute value of cosec(30) and sec(30) and find the maximum and minimum of both the values.
    3. Declare two int variables, myNumber1 and myNumber2, and initialize them with 45 and 27 respectively. Write statements to find the cosine and tangent for each variable. Print the rounded values for each result obtained.
  1. Compute the result of) Print the ceiling value of the result.

**// Random Class**

1. The **Random** class can be used to generate pseudorandom numbers – they look like random numbers, and they act like random numbers, but they aren’t quite random. For help in completing the following problems, refer to **(Random class Java API)**
   1. Create an instance of the **Random** class using *no* seed value. Generate and print 4 pseudo-random integer values between 0 (inclusive) and 300 (exclusive) and print 3 random values without passing any integer values. Run your program two to three times.
   2. Did you get the same result each time? Write your answer in a print statement.
   3. With seed value 30L create an instance of the **Random** class, generate and print 4 pseudo-random integer values between 0 (inclusive) and 300 (exclusive) and print 3 random values without passing any integer values. (**L** following the **30** indicates that the number is of type **long**, rather than **int**)(Note: Random value generated will vary for each individual).
   4. Run your program two to three times. Did you get the same result each time? Write your answer in a print statement.
   5. Compare your results from b) and d) and explain the difference. Write your explanation in a print statement.

**Sample Output:** The output should be printed as it is in the below box.

|  |
| --- |
| OUTPUT:  \*\*\*\*\*\*\*\* String Class \*\*\*\*\*\*\*\*  Welcome to Northwest Missouri State University  The length of the concatenated string is: 59  Welcome to Northwest Missouri State University!  Length of the above string is: 47  Retrieved: State University  state university  Index of last e in State University' is at: 10  The result after comparing the strings using == is false  The result after comparing the strings using .equals method is true  ANSWER TO BE HERE  First occurrence of applied is at: 58  we learned about honesty and integrity!  we\_learned\_about\_honesty\_and\_integrity!  ANSWER TO BE HERE  \*\*\*\*\*\*\*\* Math Class \*\*\*\*\*\*\*\*  12 raised to the power of 6: 2985984.0  sec (12): 1.185039176093985  The rounded value of sec(12) is 1.19  Square root of the 37.15 is: 6.0950799830683104  Ceil Value of 37.15: 38.0  Floor Value of 37.15: 37.0  sin 60° cos 45° + cos 60° sin 45° = -0.9705352835374847  Theoretical value of tan(90) is: -1.995200412208242  Cubic root of modulus value of tan(90) is: 1.2589123923257013  Absolute value of Cosecant of 30 is: 1.012113353070178  Absolute value of Secant of 30 is: 6.482921234962678  Minimum value in Cosec(30) and Sec(30) is: 1.012113353070178  Maximum value in Cosec(30) and Sec(30) is: 6.482921234962678  Rounded Value of cos 45: 1  Rounded Value of cos 27: 0  Rounded Value of tan 45: 2  Rounded Value of tan 27: -3  The value of the given equation is: 21.0  \*\*\*\*\*\*\*\* Random Class \*\*\*\*\*\*\*\*  4 pseudo-random integer values between 0 (inclusive) and 300 (exclusive)  First random integer value is: 196  Second random integer value is: 95  Third random integer value is: 221  Fourth random integer value is: 44  3 pseudo-random integer values without seed value and bounds  Fifth random integer value is: 788757536  Sixth random integer value is: 796080944  Seventh random integer value is: -119091367  ANSWER TO BE HERE  4 pseudo-random long values between 0 (inclusive) and 300 (exclusive)  First random long integer value is: 206  Second random long integer value is: 168  Third random long integer value is: 65  Fourth random long integer value is: 4  ANSWER TO BE HERE  3 pseudo-random long values with seed value and without bounds  Fifth random long integer value is: 926136273  Sixth random long integer value is: -232178700  Seventh random long integer value is: -615224923  ANSWER TO BE HERE |

**Submit your solution by following the steps below:**

* Save your files in NetBeans.
* Zip your entire Project. (File name should be *Lastname*\_Lab01Objects.zip where Lastname is your last name.)
* Submit the Zip file to the Lab01Objects Dropbox.
* Download the Zip file you have submitted.
* Look in the Zip file and verify that **StringsAndNumbers.java** is correct. If not resave your project in NetBeans and resubmit.