Lab 1: Flow control/Operators/Assignments

**Optional-----------------------------------------------------------------------------------------------------**

**Exercise 1:** Create a method to find the sum of the cubes of the digits of an n digit number

**Exercise 2:** Write a java program that simulates a traffic light. The program lets the user select one of three lights: red, yellow, or green with radio buttons. On entering the choice, an appropriate message with “stop” or “ready” or “go” should appear in the console .Initially there is no message shown.

**Exercise 3:** The Fibonacci sequence is defined by the following rule. The first 2 values in the sequence are 1, 1. Every subsequent value is the sum of the 2 values preceding it. Write a Java program that uses both recursive and non-recursive functions to print the nth value of the Fibonacci sequence?

**Exercise 4:** Write a Java program that prompts the user for an integer and then prints out all the prime numbers up to that Integer?

**Mandatory----------------------------------------------------------------------------------------------------**

**Exercise 5:** Create a class with a method which can calculate the sum of first n natural numbers which are divisible by 3 or 5.

**Note: Complete this exercise on Doselect. [DoSelect-Lab1\_1]**

|  |  |
| --- | --- |
| Method Name | calculateSum |
| Method Description | Calculate Sum |
| Argument | int n |
| Return Type | int-sum |
| Logic | Calculate the sum of first n natural numbers which are divisible by 3 or 5. |

**Exercise 6:** Create a class with a method to find the difference between the sum of the squares and the square of the sum of the first n natural numbers.

**Note: Complete this exercise on Doselect. [DoSelect-Lab1\_2]**

|  |  |
| --- | --- |
| Method Name | calculateDifference |
| Method Description | Calculate the difference |
| Argument | int n |
| Return Type | int - Sum |
| Logic | Find the difference between the sum of the squares of the first n natural numbers and the square of their sum.  For Example if n is 10,you have to find  (1^2+2^2+3^2+….9^2+10^2)-  (1+2+3+4+5…+9+10)^2 |

**Exercise 7:** Create a method to check if a number is an increasing number

**Note: Complete this exercise on Doselect. [DoSelect-Lab1\_3]**

|  |  |
| --- | --- |
| Method Name | checkNumber |
| Method Description | Check if a number is an increasing number |
| Argument | int number |
| Return Type | boolean |
| Logic | A number is said to be an increasing number if no digit is exceeded by the digit to its left.  For Example : 134468 is an increasing number |

**Exercise 8:** Create a method to check if a number is a power of two or not

**Note: Complete this exercise on Doselect. [DoSelect-Lab1\_4]**

|  |  |
| --- | --- |
| Method Name | checkNumber |
| Method Description | Checks if the entered number is a power of two or not |
| Argument | int n |
| Return Type | boolean |
| Logic | Check if the input is a power of two.  Ex: 8 is a power of 2 |

Lab 2: Arrays

**Mandatory---------------------------------------------------------------------------------------------------------------**

**Exercise 1:** Create a method which accepts an array of integer elements and return the second smallest element in the array

**Note: Complete this exercise on Doselect. [DoSelect-Lab3\_1]**

|  |  |
| --- | --- |
| Method Name | getSecondSmallest |
| Method Description | Get the second smallest element in the array |
| Argument | int[] |
| Return Type | int |
| Logic | Sort the array and return the second smallest element in the array |

**Exercise 2:** Create a method that can accept an array of String objects and sort in alphabetical order. The elements in the left half should be completely in uppercase and the elements in the right half should be completely in lower case. Return the resulting array.

**Note: If there are odd number of String objects, then (n/2) +1 elements should be in UPPPERCASE**

**Note: Complete this exercise on Doselect. [DoSelect-Lab3\_2]**

|  |  |
| --- | --- |
| Method Name | sortStrings |
| Method Description | accept an array of String objects and sort in  Alphabetical order. |
| Argument | String[] arr |
| Return Type | String |
| Logic |  |

**Exercise 3:** Create a method which accepts an integer array, reverse the numbers in the array and returns the resulting array in sorted order

**Note: Complete this exercise on Doselect. [DoSelect-Lab3\_3]**

|  |  |
| --- | --- |
| Method Name | getSorted |
| Method Description | Return the resulting array after reversing the numbers and sorting it |
| Argument | int [] |
| Return Type | int |
| Logic | Accept and integer array, reverse the numbers in the array, sort it and return the resulting array.  Hint  Convert the numbers to String to reverse it |

**Exercise 4:** Create a method which accepts an integer array and removes all the duplicates in the array. Return the resulting array in descending order

|  |  |
| --- | --- |
| Method Name | modifyArray |
| Method Description | Remove duplicates |
| Argument | int [] |
| Return Type | int [] |
| Logic | Remove the duplicate elements in the array and sort it in descending order |

Lab 3: Strings and Parsing

**Exercise 1:** Write a Java program that reads a line of integers and then displays each integer and the sum of all integers. (Use String Tokenizer class)?

**Note: Complete this exercise on Doselect. [DoSelect-Lab6\_1]**

**Exercise 2:** Create a class containing a method to create the mirror image of a String. The method should return the two Strings separated with a pipe(|) symbol .

|  |  |
| --- | --- |
| Method Name | getImage |
| Method Description | Generate the mirror image of a String and add it to the existing string. |
| Argument | String |
| Return Type | String |
| Logic | Accepts One String  Find the mirror image of the String  Add the two Strings together separated by a pipe(|) symbol.  For Example  Input : EARTH  Output : EARTH|HTRAE  Hint: Use StringBuffer API (Ex: For this problem reverse method in Stringbuffer can be used)  Note: Learn the other APIs in StringBuffer |

**Exercise 3:** Create a method which accepts a String and replaces all the consonants in the String with the next alphabet.

**Note**: Consonant refers to all alphabets excluding vowels

|  |  |
| --- | --- |
| Method Name | alterString |
| Method Description | Replace consonants |
| Argument | String |
| Return Type | String |
| Logic | Return the String replacing all the consonants with the next character.  For Example :JAVA should be changed as KAWA |

**Exercise 4:** Create a method that accepts a number and modifies it such that the each of the digit in the newly formed number is equal to the difference between two consecutive digits in the original number. The digit in the units place can be left as it is.

Note: Take the absolute value of the difference. Ex: 6-8 = 2

|  |  |
| --- | --- |
| Method Name | modifyNumber |
| Method Description | Accepts a number and modify it as per the requirement |
| Argument | int number1 |
| Return Type | int |
| Logic | Accept a number and modify it such that the each of the digit in the newly formed number is equal to the difference between two consecutive digits in the original number.  For example.  Input: 45862  Output:13242  **Algorithm:**   Convert number into String   Extract each char using charAt method   Convert char to int and find the difference   Create new StringBuffer object and keep adding the difference   Finally convert StringBuffer to int |

**Exercise 5**: Write a Java program that displays the number of characters, lines and words in a text?

**Exercise 8:** Create a method that accepts a String and checks if it is a positive string. A string is considered a positive string, if on moving from left to right each character in the String comes after the previous characters in the Alphabetical order. For Example: ANT is a positive String (Since T comes after N and N comes after A). The method should return true if the entered string is positive.

**Note: Complete this exercise on Doselect. [DoSelect-Lab6\_5]**

**Exercise 9:** Create a method to accept date and print the duration in days, months and years with regards to current system date.