Java Programming

Lab Guide

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Lab 1 - Expressions & Flow Control

Requirements

All of the following exercises in this part should be implemented within the main () method. No further classes or methods are required

Random

In order to randomize values between 0-100 use the following:
int example = (int)(Math.random()*101);

1. Create a class named Printer
    - Define the following variables & initialize each with the specified values:
        - part1 – "There will be"
        - visitors – 5
        - part2 – "people for dinner."
    - Print the complete message: "There will be 5 people for dinner"
2. try to increment the number of visitors to 7 [visitors+2] in the print line
    - What happens when adding just visitors**+2**?
    - What is the right way of updating the print line?
3. Create a class named Test
    - Defines 2 random numbers: a, b
    - print to console:
        - each number
        - the sum of the numbers
        - the average value
        - the remainder when dividing each in 10
        - the area of a rectangle where one number is the width and the other is the height
4. Create a class named Test
    - Define a random number between 100 to 350 for time in minutes of a movie
    - Print the time in minutes
    - Print the time in terms of Hours and Minutes
5. Create a class that defines 2 random numbers and prints the bigger value

Lab 2 – Simple Conditions

1. Create a new class that defines a random number with a value between 0-100.
   - if the number is greater than 50 – print "Big!"
   - if the number is less than 50 – print "Small!"
   - if the number equals to 50 – print "Bingo!"

2. Create a new class that defines a random number with a value between 0-100.
   - if the value is between 0-50 – print "Small!"
   - else – print "Big!"
   - in addition:
     - if the value is even (can be divided by 2) – print "Even"
     - else – print "Odd"

3. Create a new class named "SalaryRaiser"
   - define a random number named 'salary' with a value between 5000-6000.
   - print the current salary
   - Now, raise the salary:
     - By 10% - only if the result is not greater than 6000 (which is the maximum salary allowed)
     - By 5% - Otherwise.
   - print the updated salary

4. Create a class that defines 3 random numbers and prints the bigger value

5. Create a class that defines 3 random numbers and prints the smaller value

Lab 3 - Complex Conditions

1. Create a class named "TaxCalculator"
   - Salary taxes are calculated according to the following:
     - 0- 23,000 nis → tax rate is 10%
     - 23,000- 50,000 nis → tax rate is 20%
     - 50,000- 100,000 nis → tax rate is 30%
     - 100,000 - up nis → tax rate is 40%
   - that takes a random salary of an employee (randomize a value to be used as an input)
   - Print the salary before tax
   - Print the tax calculation
   - Print the salary after tax

2. Bonus! - Implement the Tax Calculator Exercise this time with Differential Tax!

3. Create a class that randomizes a value to present a year (like 970, 1990, 2010 …) and prints the year and if it is leap year or not.
   Leap year definition:
   - divide by 4 AND not divide by 100
   - divide by 400

Lab 4 - Loops

1. Print 10 times without any Loop: “Hello World”

2. Now print 10 times “Hello World” Using:
   - for loop
     - Incremental loop
     - Decremental Loop
   - While loop
     - Incremental loop
     - Decremental Loop

3. Create a class that defines a random number and prints all numbers from 1 to that number

4. Create a class that defines two random values and prints all values between them. note - which variable holds the higher value is not known.

5. Create a class that defines a random number and prints all even numbers from 0 to that number

6. Create a class that defines two random values ‘max’ and ‘den’ and prints all the numbers from 0 to ‘max’ that can be divided with ‘den’

7. Create a class that defines a random number between 1-7.
   - print the number
   - prints the factorial value [4 → 1 X 2 X 3 X 4]

8. Regarding the factorial exercise print the factorial using:
   - for loop
     - Incremental loop
     - Decremental Loop
   - While loop
     - Incremental loop
     - Decremental Loop

Lab 5 - More Loops

1. Create a class that defines a random number with value between 0-10000 and print the length of digits: [1998 → 4]

2. Create a class that defines a random number with value between 0-10000 and print the right digit: [1998 → 8]

3. Create a class that defines a random number with value between 0-10000 and print the left digit: [1998 → 1]

4. Create a class that defines a random number with value between 0-10000 and print the opposite order of the number's digits: [1998 → 8991]

5. Create a class that defines a random number with value between 0-10000 and print the following details with clear messages:
   - number of digits [4867 → 4]
   - the first left digit [6843 → 6]
   - sum of the number's digits [473 → 14]
   - opposite order of the number's digits [5892 → 2985]

6. Create a class that defines a random value between 0-100,000 and prints if it is a palindrome (a symmetric number like: 12321, 666, 47974, 404 …)

7. Create a class named 'Boom' that implements the game "7-Boom" for all values from 1 to 100. The game rules are:
   - if the current number can be divided by 7 – print "boom"
   - if the current number has the digit '7' – print "boom"
   - otherwise – print the number as is

Lab 6 – Loops with Fibonacci Set

Fibonacci Set

- A Fibonacci set is an array of numbers: [1,1,2,3,5,8,13,21,34,55,89…]
- The first two elements set to 1:
    - a1 = 1
    - a2 = 1
- Each number is the sum value of the two previous numbers

1. Create a class that print the 40 first items of a Fibonacci series

2. Create a class that defines a random number named “index” with a value between 1-40 and prints the number in Fibonacci set that is located in the “index” position [6 → 8]

3. Create a class that defines a random value between 10-50 and prints Fibonacci set from 1 to that value

Lab 7 - Loops with characters

1. Assume: char[] arr = {'a','b','c','a','b','d','r','c'};
    - How many ‘a’ char inside the array?
    - How many ‘a’ or ‘c’ chars inside the array?

2. Assume: String name = “John Bryce”;
    - Convert this String into char array
    - How many ‘h’ letters inside the string?

3. Assume: String str = “Sara Shara Shir Cameach”;
    - Convert this String into char array
    - How many Vowels (A,E,I,O,U) letters inside the string?

Lab 8 – Arrays

1. Create a class that creates an array[10] of numbers with random values between 0-100 and print all numbers each in a new line

2. Create a class that creates an array[10] of numbers with random values between 0-100 and print all numbers each in the same line

3. Create a class that creates an array[10] of numbers with random values between 0-100 and prints the total sum

4. Create a class that creates an array[10] of numbers with random values between 0-100 and prints the total sum and the average

5. Create a class that creates an array[10] of numbers with random values between 0-100 and prints the maximum number

6. Create a class that creates an array[10] of numbers with random values between 0-100 and prints the maximum number and its index in the array

7. Create a class that creates an array[10] of numbers with random values between 0-100 and prints the minimum number and its index in the array

8. Create a class that creates an array[10] of numbers with random values between 0-100 and prints:
    - All numbers in same line
    - total sum
    - average
    - maximum value and its index in the array
    - minimum value and its index in the array

Lab 9 - More Arrays

1. Create a class that creates an array[10] of numbers with random values between 0-100 and print all even numbers

2. Create a class that creates an array[10] of numbers with random values between 0-100 and print all odds numbers

3. Create a class that creates an array[10] of numbers with random values between 0-100 and sum of all even numbers

4. Create a class that creates an array[10] of numbers with random values between 0-100 and print all odd numbers

5. Create a class that creates an array[10] of numbers with random values between 0-100 and prints:
   - sum of all even numbers
   - sum of all odd numbers
   - Print which sum is greater

6. Create a class that creates an array[50] of numbers with random values between 0-100 and prints:
   - the highest value and its index in the array
   - the lowest value and its index in the array

Lab 10 - More Arrays

1. Create a class that creates an array that initialize with the next values {1,2,3,1,2,3,3,2,1,9,5,1,1,9}
   - print:
     - How many 3 values are in the array?
     - How many 1 values are in the array?

2. Create a class that eliminates duplicates. The class should be capable of getting an array with duplicate values and return an array of unique values generated from it. For example, for the input {1,2,5,1,6,1,5,4,8} the result should be {1,2,5,6,4,8}

3. Create a class that reverses a given array order. For example, for the input {6,8,4,2,7,5} the result should be {5,7,2,4,8,6}.
   - create an array[10] of numbers with random values between 0-10 to be used as an input
   - print the array before and after reversing

4. Create a class that calculates students' average year grade.
   - create a matrix according to the following:
     - there are 20 students in class
     - there are 10 different grades per student (randomize values between 80-100 as input)
   - print each student average grade
   - print the class average grade