

Placement test on programming

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Basics

1. Write Java program to check if a number is palindrome?

A number is called a palindrome if number is equal to reverse of number.

e.g. 121 is palindrome because reverse of 121 is 121 itself. On the other hand 321 is not palindrome because reverse of 321 is 123 which is not equal to 321

2. Write java program to sort an integer array without using API methods?

Don't use Collections.sort for instance

3. Write a program in Java to reverse any String?

e.g. "asymmetric" → "cirtemmysa"

4. Write 2 Java programs that prints the following outputs:

a-

```
|O|O|X|
|O|X|X|
|X| |O|
```

b-

```
1
1 1
1 2 1
1 3 3 1
1 4 6 4 1
1 5 10 10 5 1
1 6 15 20 15 6 1
1 7 21 35 35 21 7 1
1 8 28 56 70 56 28 8 1
```

5- Given the following function :

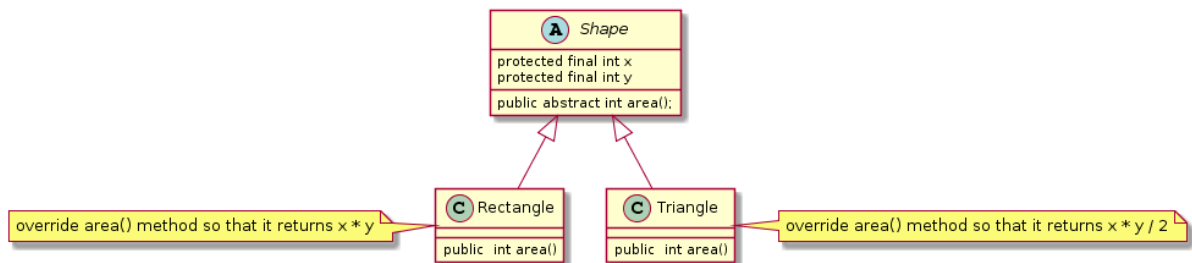
```
public int execute(int m, int n) {
    if(n == 0){ return 0;}
    else if(m == 0){ return 2 * n;}
    else if(n == 1){ return 2;}
    else { return execute(m - 1, execute(m, n - 1));}
}
```

What is the value of?

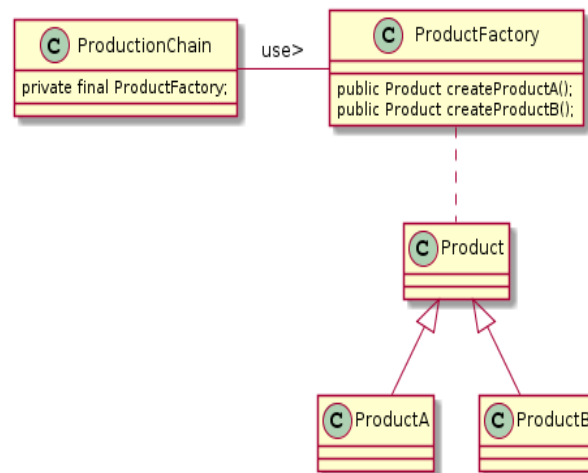
- a- `execute(1, 10)`
- b- `execute(0, n)`
- c- `execute(1, n)`

6- Translate in java code the following class diagrams

a-



b-



7- Open this java project (in attachment to this document) in an IDE (eclipse ...):



geometry.zip

This project contains two solutions to calculate the perimeter of triangle and circle:

- Procedural solution: located on "geometry\src\procedural"
- Object oriented (OO) solution: located on "geometry\src\object\oriented"

Questions:

- What does 'geometry\src\procedural\Geomtery.java' do?
- What does 'geometry\src\object\oriented \Geomtery.java' do?
- How many classes the OO solution contains?

- d- For each class in the OO solution, describe what is it about?
- e- In your opinion, what is the solution that seems easy to implement: procedural or OO? Why?
- f- Is there any drawbacks or issues with the procedural solution?
- g- Count some advantages of the OO solution?
- h- If there is a need to calculate the perimeter of a new shape (for example Rectangle), what will be the change in both solutions? (Write codes to illustrate required changes).

Miscellaneous

Plain Java

1. What is the difference between an abstract class and an interface ?
2. What is an abstract class? What is a final class ?
3. What is the "transient" keyword used for ?

OO

1. What is the difference between a class and an object ?
2. Can you implement OO without classes ?
3. What are the basic principles of the OO paradigm (SOLID) ?
4. What is polymorphism ?
5. What is Demeter's law?

Design Patterns

1. What's a Singleton?
2. What's a Factory pattern?.