

JAVA EXERCISES

1. Describe what Hibernate is and what it is used for.

2. Write a Java program to generate a magic square of order n (all row, column, and diagonal sums are equal).

From Wikipedia, In recreational mathematics and combinatorial design, a magic square is a $n \times n$ square grid (where n is the number of cells on each side) filled with distinct positive integers in the range $1, 2, \dots, n^2$ such that each cell contains a different integer and the sum of the integers in each row, column and diagonal is equal. The sum is called the magic constant or magic sum of the magic square. A square grid with n cells on each side is said to have order n .

3) Given an array of integers.

Write an algorithm that brings all nonzero elements to the left of the array, and returns the number of nonzero elements.

The algorithm should operate in place, i.e. shouldn't create a new array.

The order of the nonzero elements does not matter.

The numbers that remain in the right portion of the array can be anything.

Example:

Given the array `[1, 0, 2, 0, 0, 3, 4]`, A possible answer is `[4, 1, 3, 2, ?, ?, ?]`, 4 non-zero elements, where "?" can be any number.

Code should have good complexity and minimize the number of writes to the array.

```
[ 1, 0, -2, 0, 0, 3, 4, 0, 0 ]
[ 4, 1, 3, -2, ?, ?, ? ] return 4
```

- What is the complexity of your algorithm?

4) Create a package called documents...

- A. Include in it two classes, Invoice and Order, to represent invoices and orders, respectively.
- B. Next, out of the package, create a small program that creates objects of both types and displays them on the screen.
- C. Add a third document type, UrgentOrder, that inherits directly from Order. Check that the above program is still working properly if we replace an Order with an UrgentOrder.
- D. Create a new document type, called Contract, and include it in the HumanResources documents subpackage. In this last package, include also a type of CV document to represent the curriculum vitae of a person.
- E. If you haven't already done so, create a generic Document class from which inherit (directly or indirectly) all the other classes we have defined to represent different types of documents.
- F. Implement a small program that creates a document of a type selected by the user. Display the document regardless of the specific type of document that has been created in the previous step



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