

Backend Developer Test

Instructions

- 1) You need to complete this test within 3 hours from the time you receive it.
- 2) Submit the answers by email or Telegram.
- 3) Submit answers for questions 1 and 2 in a Word (or WordPad) document.
- 4) Submit programming assignments, questions 3 and 4, as a ZIP file of the entire Visual Studio solution.

Question 1: Testing Fundamentals

*** THIS IS NOT A PROGRAMMING TASK ***

Imagine that someone has already developed a program in C#, .NET Core that accepts a positive integer number as input and outputs all prime numbers that the input is divisible by.

Example: for input 350, the output is: 2, 5, 7.

You need to **test** that the program works correctly. Write what test cases you will need to execute to verify that.

Example:

Test 1

1. Enter 350

Expected output: 2, 5, 7

Question 2: SQL Proficiency

The database has two tables:

Table 1: department

id INT PRIMARY KEY
name VARCHAR(50)

Table 2: employee

```
id INT PRIMARY KEY
department_id INT
manager_id INT(11)
name VARCHAR(50)
income DECIMAL
```

Write a query that outputs all employees that do not have a manager, who works in the same department.

Question 3: OOP Design Fundamentals

Write a console application in C#, .NET Core that computes the area and perimeter of a circle and rectangle. Create an abstract class "Shape" and a factory method that generates objects of types Circle and Rectangle.

Example Input

```
circle:10
rectangle:10x20
```

Example Output

```
Area: 314.16, Perimeter: 62.83
Area: 200, Perimeter: 60
```

Question 4: Algorithms

Write a console application in C#, .NET Core that for a given word, derives a palindrome by inserting the minimum number of characters into that word. (A palindrome is a word that reads the same backward as forward, e.g. "madam".)

Example Input

```
abb
a
aabb
```

Example Output

```
abb => abba (not bbabb)
a => a
aabb => aabbaa (instead of bbaabb, lexicographically higher one)
```