

The exam is taken without any material beside writing material, and in silence. Answer the following questions and problems, trying to be as clear and as accurate as possible. Take the time to read carefully the statements before trying to answer them. You can write on the back of your test, in which case you're asked to indicate it clearly. This exam has 5 problems, for a total of 105 points.

Problem 1

A theme park has the following rates:

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Age (in years)	From 0 to 5	From 6 to 18	From 19 to 64	65 and over
Price (in \$)	Free	5.00	12.00	Free

Write a program that asks the user his/her age. If the user enters something that is not an integer, or a negative value, your program should ask for a “sensible” value, and keep asking as long as the value the user typed in was not “sensible”. When your program obtained a “sensible” value, it should display (nicely!) at the screen “It is free for you”, or the price, accordingly.

Problem 2

Read the following code, and answer the following two questions:

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```
switch (citizenship) {
    case ("US"):
    case ("CA"):
        if (income > 100)
            if (age < 21) Console.WriteLine("Go to office A.");
            else if (age < 60) Console.WriteLine("Go to office B.");
            else Console.WriteLine("Go to office C.");
        else
            Console.WriteLine("Go to office D.");
    break;
    case ("DE"):
        if (income > 200 && age > 18) Console.WriteLine("Go to office E.");
        else Console.WriteLine("Go to office F.");
    break;
    case ("FR"):
        if (age <= 18 || income <= 10) Console.WriteLine("Go to office G.");
        else if (income > 200) Console.WriteLine("Go to office H.");
    break;
    default:
        if (age > 21) Console.WriteLine("Go to office I.");
        else Console.WriteLine("Go to office J.");
    break;
}
```

1. Depending on the values of age, citizenship and income, determine what would be displayed:

age	citizenship	income	"Go to office..."
18	"CA"	80	
21	"UK"	150	
18	"US"	120	
25	"FR"	210	
25	"DE"	210	
23	"AZ"	150	
21	"FR"	8	
18	"DE"	200	
62	"CA"	120	

2. Give a set of ("legal") values for which nothing would be displayed.

Problem 3

Write a program that asks the user to enter a whole number. As long as the user enters a number, you should ask for another number. As soon as the user enters something that is not a number, display the product of all the values entered by the user. Here is an example of execution:

_____/25 p.

```
Enter a number, or anything else to quit.  
2 ↵  
Enter a number, or anything else to quit.  
5 ↵  
Enter a number, or anything else to quit.  
-1 ↵  
Enter a number, or anything else to quit.  
I'm done! ↵  
The product of the numbers you entered is -10.
```

Problem 4

Write a program that asks the user to guess your favorite number, and ask as long as the user did not guessed it. You should keep the count of the attempts, i.e., of the number of times the user entered an integer that was not your favorite number. You don't have to perform user-input validation, and can assume that the user will always enter numbers.

Here is an example of execution, assuming my favorite number is 11:

```
Try to guess my favorite number!  
14 ↵  
Try to guess my favorite number!  
10 ↵  
Try to guess my favorite number!  
11 ↵  
You won, it was 11! It took you 3 attempts.
```

_____/25 p.

Problem 5

Answer the following short questions about the object-oriented paradigm.

_____/20 p.

a) What is the return type of a constructor?

b) In the following, underline the signature of the method:

```
public int Scale(int ratio){length *= ratio;}
```

c) Define method overloading.

d) Write a “no args” constructor (that is, a constructor that takes 0 arguments) for a Square class that has one `int` attribute, called `dimension`.

e) What is the name of the method automatically called by C# when we are trying to display an object using `Console.WriteLine`?

f) Draw the UML diagram of a Square class with one attribute, an `int` called `dimension`, and two methods, a setter and a getter for `dimension`.