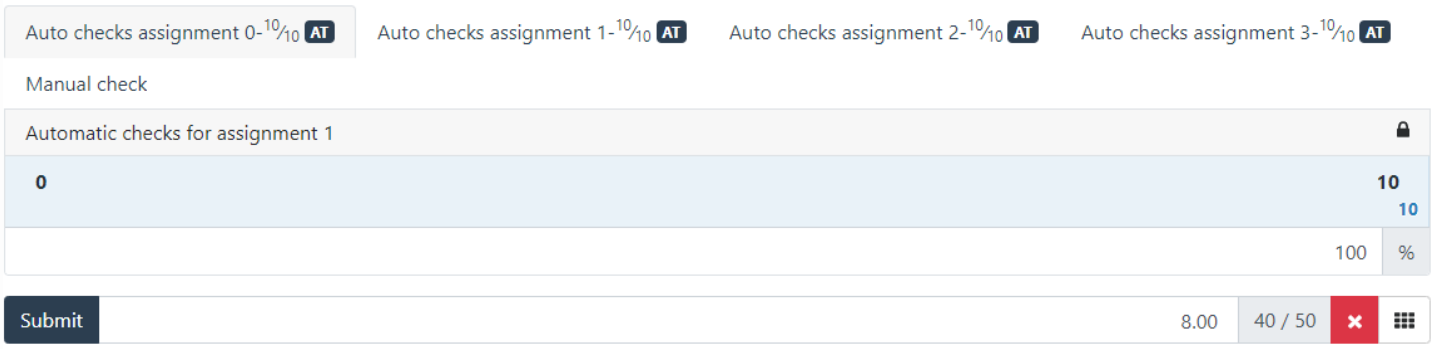
Week 1 assignments

When creating the program code, you must apply the following basic principles:

- create a separate project for each assignment;
- use name ‘assignment1’, ‘assignment2’, etcetera for the projects;
- create one solution for each week containing the projects for that week;
- make sure the output of your programs are the same as the given screenshots;

CodeGrade auto checks

Make sure all CodeGrade auto checks pass (10/10) for your assignments. The manual check will be done by the practical teacher.



Assignment 0 – Useful methods

To read data for your application (like a name or an age) you always need to write the same code. In this assignment you will create a few methods that will make reading data a bit easier.

You will also use these methods in assignment 1 and 2. This means that you want to write these methods as clear as possible, and to make them work as good as possible.

This week we will copy the methods to other assignments, but later we will create our own code-library.

a) Create a method with signature:

```
int ReadInt(string question)
```

that prints the given question and subsequently reads an integer value. This value is returned by the method.

→ Test the method (with the code below).

b) Also create a variant of `ReadInt` that checks if the given `integer value` is within a certain range. This means that you'll have 2 methods `ReadInt`. We call this 'method overloading'.

The signature of this method is:

```
int ReadInt(string question, int min, int max)
```

When the entered value is not within the range `[min..max]` the question is asked again and a new value is read (use a loop).

→ To implement this 2nd ReadInt-method, **make use of the 1st `ReadInt`-method**.

→ Test the method (with the code below).

c) Also create a method with signature:

```
string ReadString(string question)
```

This method asks a question and returns the answer.

→ Test the method (with the code below).

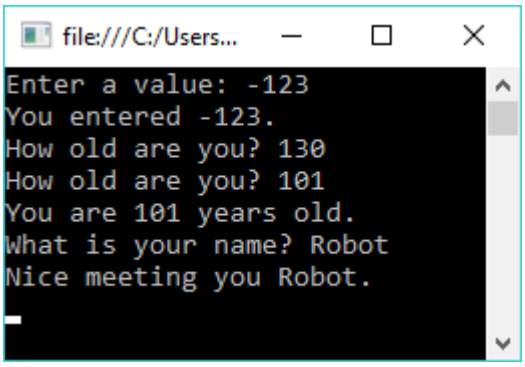
```
static void Main()
{
    Program myProgram = new Program();
    myProgram.Start();
}

void Start()
{
    int value = ReadInt("Enter a value: ");
    Console.WriteLine($"You entered {value}.");

    int age = ReadInt("How old are you? ", 0, 120);
    Console.WriteLine($"You are {age} years old.");

    string name = ReadString("What is your name? ");
    Console.WriteLine($"Nice meeting you {name}.");

    Console.ReadKey();
}
```



Assignment 1 – Enumerations – Month

a) Create an enumeration type with name `Month` (store this enumeration in a separate file 'Month.cs') and give the enum Month 12 options: January, February, ..., November en December. Make sure that the first option (January) has value 1.

b) Create a method with signature:

```
void PrintMonth(Month month)
```

that prints the given month (just the name).
→ Call method `PrintMonth` (from the Start method) to test it.

c) Create a method with signature:

```
void PrintMonths()
```

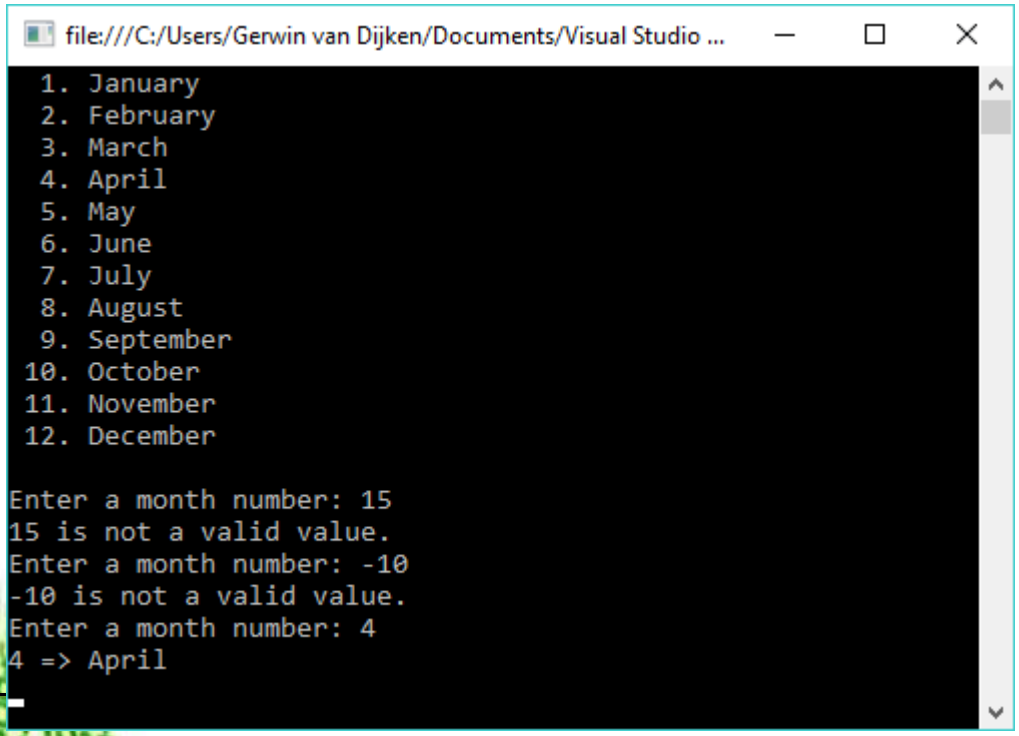
that uses method `PrintMonth` (see item b) to print all enum options of `Month` below each other (use a loop). Make sure that the numbers (1..12) are 'right-aligned'[1] zijn (see example below).
→ Call method `PrintMonths` from the Start method.

d) Create a method with signature:

```
Month ReadMonth(string question)
```

that reads a month number and converts this number from an `int`-value to an `enum`-value. This enum value is returned.
→ Call this method (from the Start method) and subsequently print the returned value (ofcourse with method `PrintMonth`, see item b).

e) What happens if an invalid number is entered (1 > number > 12)?
Modify the `ReadMonth` method to print a message when an invalid number has been entered; for testing invalid enum values **use method `Enum.IsDefined(typeof(Month), ...)`** that returns `true` or `false`. Continue reading a month number until `Enum.IsDefined` returns `true`.



[1] Some examples of right-aligned can be found at (e.g.) http://www.csharp-examples.net/align-string-with-spaces/

Assignment 2 – Structures - Person

In this assigment you will read integer and string values. Reuse your Read methods (of assignment 0) by copying them to Program.cs (of assignment 2).

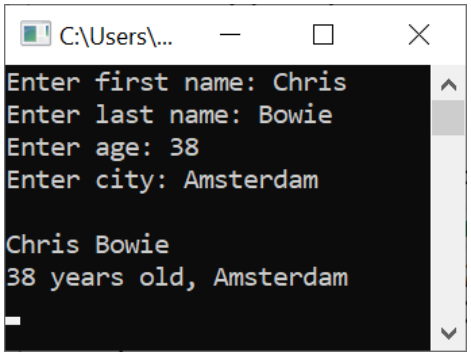
The struct Person

a) Create a `struct Person` (in a separate file) with fields `FirstName`, `LastName`, `Age` and `City`.

b) Create a method with signature

```
Person ReadPerson()
```

for reading a (complete) `Person`.
→ Use methods `ReadInt` and `ReadString` (copied from assignment 0).



c) Create a method with signature

```
void PrintPerson(Person p)
```

that prints the given `Person`.
→ Test methods `ReadPerson` and `PrintPerson` in the `Start` method (for one person).

The enum GenderType

d) Add to `struct Person` a field `Gender` of type `GenderType` (options: `Male` and `Female`).

e) Create a method with signature

```
GenderType ReadGender(string question)
```

for reading a gender. Use this in method `ReadPerson` to read the gender.

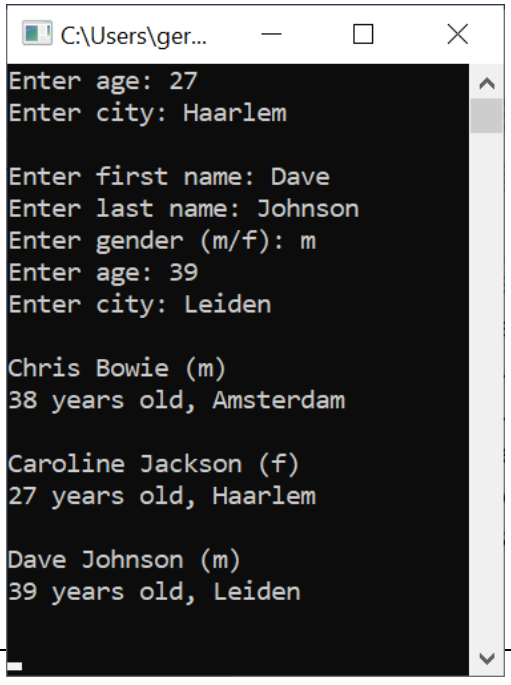
f) Also create a method with signature

```
void PrintGender(GenderType gender)
```

that prints 'm' of 'f' (without a new line) depending on the given gender.
→ Use this in method `PrintPerson` to print the gender.

Persons in an array

g) Create a `Person array` with length 3. Fill this array (in a loop) with information entered by the user. Make sure to use method `ReadPerson`.
Subsequently print all persons (again in a loop) with the `PrintPerson` method.
→ Output of the application must be (more or less) the same as the screenshot below.



Assignment 3 – Classes - Yahtzee

The class Dice

```
class Dice
{
    public int value;
    static Random rnd = new Random();
}
```

a) Create a `class Dice` (in a separate file).

b) Add a method with signature:
`public void Throw()`
inside the `class Dice` (yep, that's possible). In this `Throw` method a new random value is generated between 1 and 6. Store it in field `value`.

c) Also add to `class Dice` a method with signature:
`public void DisplayValue()`
This method displays the current `value` of the dice.

```
void Start()
{
    Dice d1 = new Dice();  // dice 1

    d1.Throw();
    d1.DisplayValue();

    // add a few more throws..
}
```

d) Test the `class Dice` by creating a Dice variable and by throwing (and displaying) this dice a few times.

The class YahtzeeGame

e) Create a `class YahtzeeGame` (in a separate file) containing a `Dice` array '`dices`'.
Add a method `public void Init()` that creates all dices (with new `Dice`).

f) Add a method to `class YahtzeeGame` with signature
`public void Throw()`
In this `Throw` method all 5 dices are thrown (by calling the method `Throw` of the class `Dice`).

g) Also add to `class YahtzeeGame` a method with signature
`public void DisplayValues()`
that displays the value of all dices (see example). Of course method `DisplayValue` of `class Dice` is used for this.

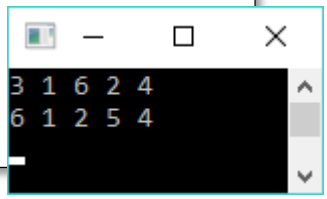
h) Now test `class YahtzeeGame` with the code below:

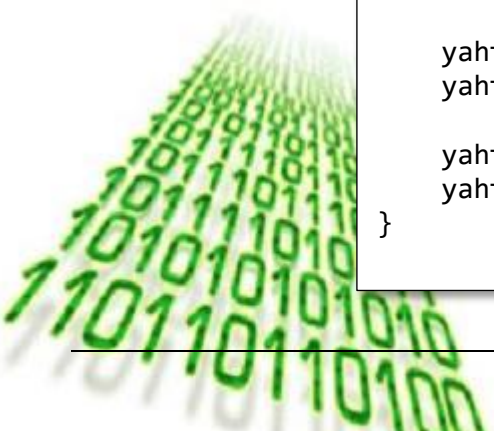
```
static void Main(string[] args)
{
    Program myProgram = new Program();
    myProgram.Start();
}

void Start()
{
    YahtzeeGame yahtzeeGame = new YahtzeeGame();
    yahtzeeGame.Init();

    yahtzeeGame.Throw();          // throw dices
    yahtzeeGame.DisplayValues();  // display result

    yahtzeeGame.Throw();
    yahtzeeGame.DisplayValues();
}
```





Check for Yahtzee, ThreeOfAKind, FourOfAKind etc.

i) Create a method inside `class YahtzeeGame` with signature:

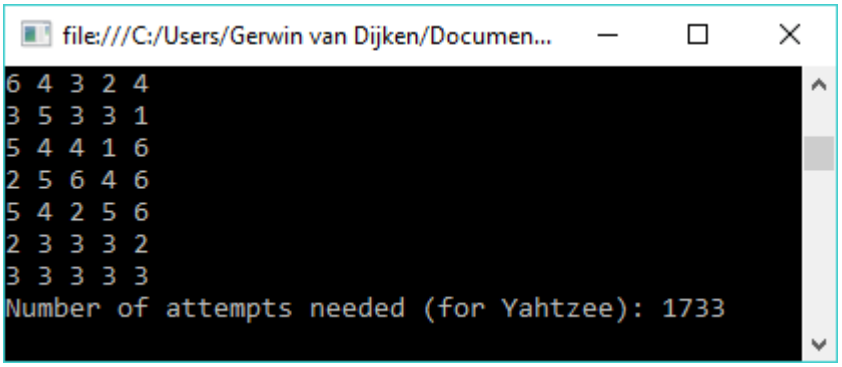
```
public bool Yahtzee()
```

This `Yahtzee` method determines if Yahtzee has been thrown (5 dices with the same value); if this is the case return `true`, otherwise return `false`.

j) Use de code printed below to check if you have implemented `class YahtzeeGame` correctly. A possible output of the program is displayed below.
How many throws (needed) did you expect (more or less) as result?
(how many yahtzee options are there, and how many different throws with 5 dices?)

k) [optional] Expand the `class` with the following Yahtzee options:
- `ThreeOfAKind`
- `FourOfAKind`

l) [optional] Expand the `class` with the following Yahtzee options:
- `FullHouse`
- `SmallStreet`
- `BigStreet`




```
static void Main(string[] args)
{
    Program myProgram = new Program();
    myProgram.Start();
}

void Start()
{
    YahtzeeGame yahtzeeGame = new YahtzeeGame();
    yahtzeeGame.Init();
    PlayYahtzee(yahtzeeGame);   // play the game
}

void PlayYahtzee(YahtzeeGame game)
{
    int nrOfAttempts = 0;

    do
    {
        game.Throw();             // throw all dices
        game.DisplayValues();     // display the thrown

        nrOfAttempts++;

    } while (!game.Yahtzee());

    Console.WriteLine($"Number of attempts needed (for Yahtzee): {nrOfAttempts}");
}
```