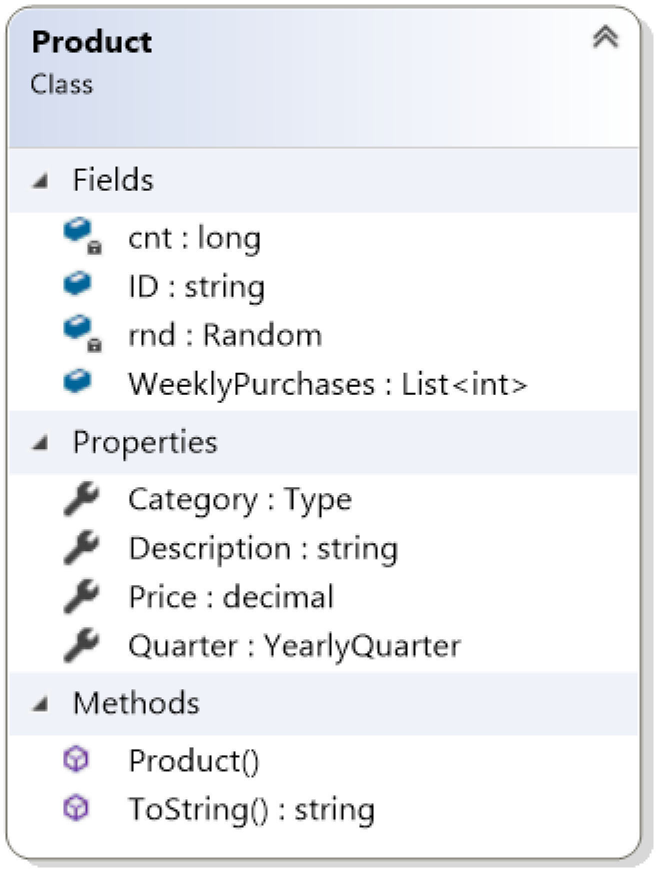
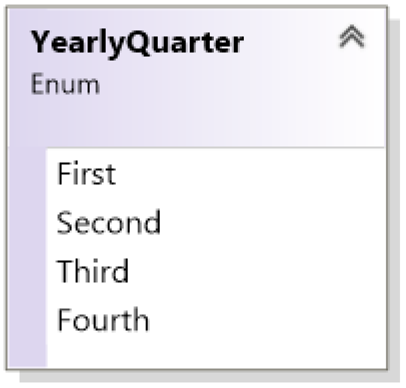
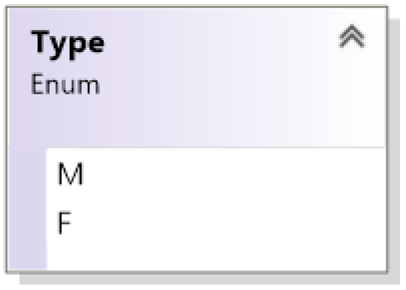
Sofia University
Department of Mathematics and Informatics

Course : OO Programming with C#.NET
Date: 31/10/2022
Student Name:

Домашно No. 4







Problem 1.
Create `class` `Product` and **`enum`** types **`Type`** and **`YearQuarter`** according to the above UML class diagram. The **`ToString`**() method returns a **`string`** composed by the **`ID`** and the **`WeeklyPurchases`.** The **constants** of **`enum` `YearlyQuarter`** are initialized sequentially to **`1,2,3`** and **`4`.** The **constants** of **`enum` `Type`** are initialized sequentially to **`chars`** ‘**`M`**’ and **‘`F`’** respectively.

Class **`Product`** has a **general purpose constructor** for initializing properties **`Description`**, **`Category`**, **`WeeklyPurchases`** and **`Price`**. Property **`Quarter`** of each **`Product`** object are initialized at random with the **`static`** object referenced by **`rnd`**. Each **`Product`** instance has an unique **`ID`** that is composed by prefix provided by the value of the **`Category`** property and **6- digit** number, **where insignificant digits are replaced by zeros** (for example, **`F000101`** or **`M0123040`**).

Initialize the **`static`** datamember **`products`** to a **`List`** of products, where the values of the above properties are provided in the following table

Sample data

Description	Category	WeeklyPurchases	Price
`Electric sander`	`M`	`99, 82, 81, 79`	`157.98`
`Power saw`	`M`	`99, 86, 90, 94`	`99.99`
`Sledge hammer`	`F`	`93, 92, 80, 87`	`21.50`
`Hammer`	`M`	`97, 89, 85, 82`	`11.99`
`Lawn mower`	`F`	`35, 72, 91, 70`	`139.50`
`Screwdriver`	`F`	`88, 94, 65, 91`	`56.99`
`Jig saw`	**`M`**	`75, 84, 91, 39`	`11.00`
`Wrench`	**`F`**	`97, 92, 81, 60`	`17.50`
`Sledge hammer`	**`M`**	`75, 84, 91, 39`	`21.50`
`Hammer`	`F`	`94, 92, 91, 91`	`11.99`
`Lawn mower`	`M`	`96, 85, 91, 60`	`179.50`
`Screwdriver`	`M`	`96, 85, 51, 30`	`66.99`

Write the following LINQ statements:

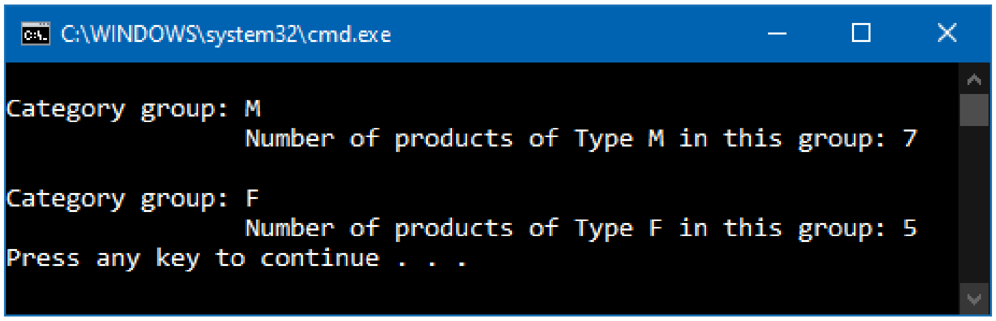
(For references see GroupBy and Query a collection of objects)

a) Write a method

```
public static void GroupByCategoryCountDescending()
```

to declare a LINQ statement that groups **`products`** by **`Category`** and shows the total number (count) of all the **`products`** in each group, where the **`Category`** groups appear sorted in **`descending`** order of the total number value. Evaluate the LINQ statement inside the method and run the method to test the execution.

Expected sample output



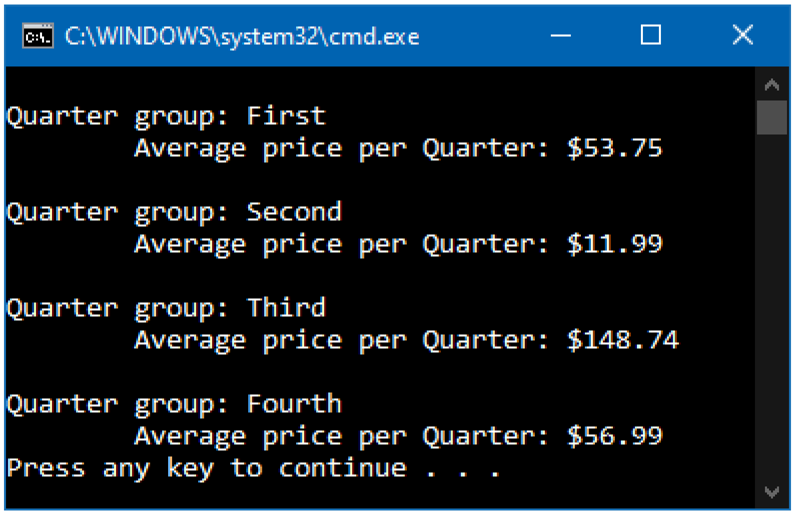
```
C:\WINDOWS\system32\cmd.exe

Category group: M
                Number of products of Type M in this group: 7

Category group: F
                Number of products of Type F in this group: 5
Press any key to continue . . .
```

b) Write a method

```
public static void GroupByQtrAndProductPriceAvg()
```

to declare a LINQ statement that groups **`products`** by **`Quarter`** and shows the **`average`** price of all the **`products`** in each group, where the **`Quarters`** are sorted in **`ascending`** order. Evaluate the LINQ statement inside the method and run the method to test the execution.

Expected sample output


C:\WINDOWS\system32\cmd.exe

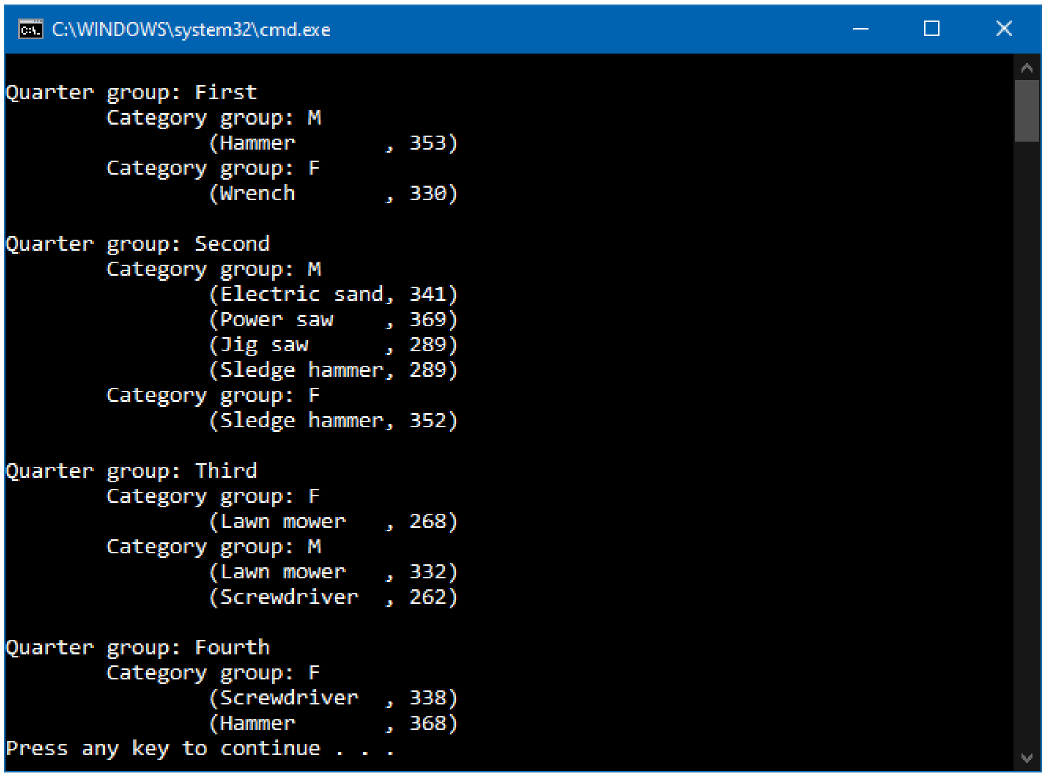
```
Quarter group: First
        Average price per Quarter: $53.75

Quarter group: Second
        Average price per Quarter: $11.99

Quarter group: Third
        Average price per Quarter: $148.74

Quarter group: Fourth
        Average price per Quarter: $56.99
Press any key to continue . . .
```

c) Write a method

```
public static void GroupByQtrCategoryWeeklySum()
```

to declare a LINQ statement that groups **`products`** by **`Quarter`** and next by **`Category`** in each **`Quarter`**. The **`Quarter`** groups must be sorted in **`ascending`** order of the **`Quarter`** and the **`Category`** groups show the **`tuple`** of **`Description`** and the total sum of **`WeeklyPurchases`** for each **`Product`** in the respective **`Quarter`**/**`Category`** group... Evaluate the LINQ statement inside the method and run the method to test the execution.

Expected sample output


C:\WINDOWS\system32\cmd.exe

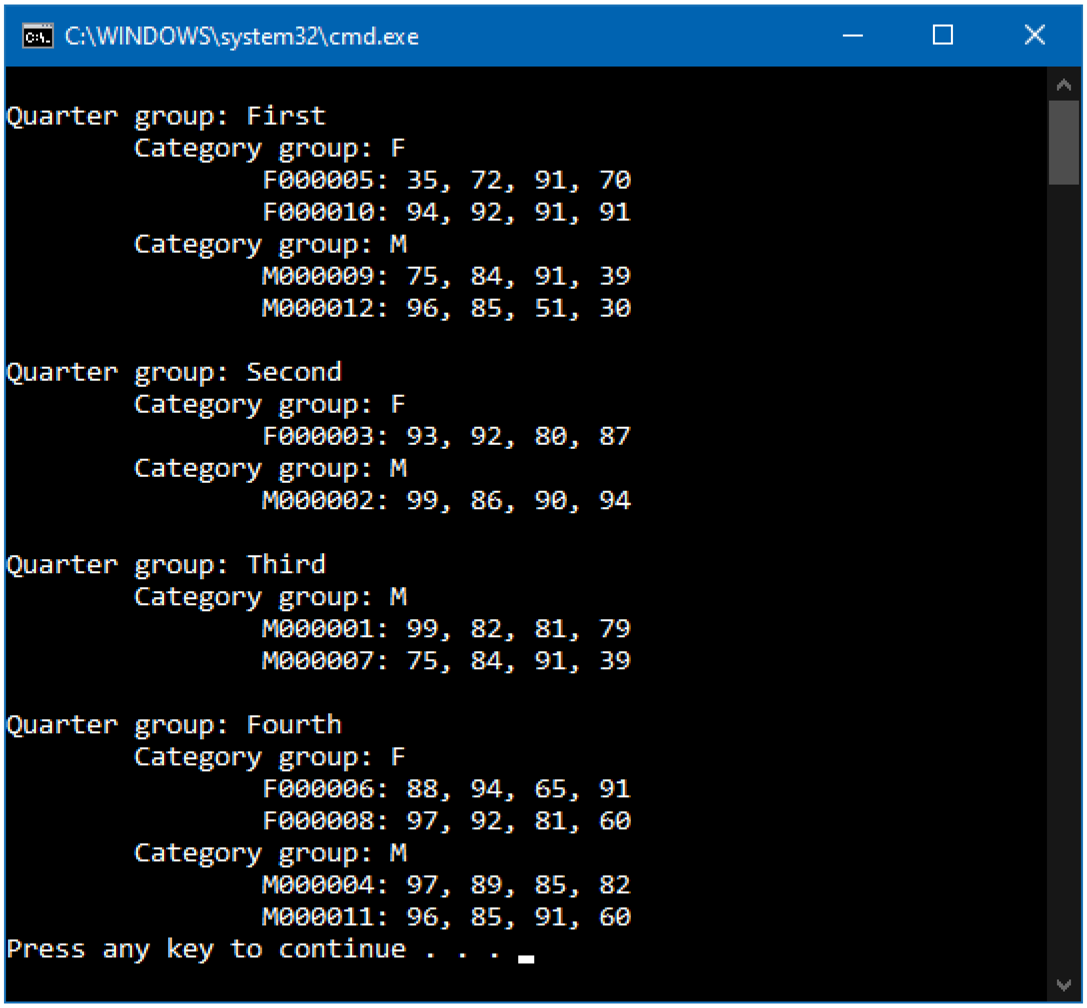
```
Quarter group: First
        Category group: M
                (Hammer       , 353)
        Category group: F
                (Wrench       , 330)

Quarter group: Second
        Category group: M
                (Electric sand, 341)
                (Power saw    , 369)
                (Jig saw      , 289)
                (Sledge hammer, 289)
        Category group: F
                (Sledge hammer, 352)

Quarter group: Third
        Category group: F
                (Lawn mower   , 268)
        Category group: M
                (Lawn mower   , 332)
                (Screwdriver  , 262)

Quarter group: Fourth
        Category group: F
                (Screwdriver  , 338)
                (Hammer       , 368)
Press any key to continue . . .
```

d) Write a method

```
public static void GroupByQtrCategoryAndProducts()
```

to declare a LINQ statement that groups **`products`** by **`Quarter`** and next by **`Category`** in each **`Quarter`**. The **`Quarter`** groups must be sorted in ascending order of the **`Quarter`** and the **`Category`** groups in ascending order of the **`Category`**. Show all the **`products`** in each **`Category`** group sorted in **`ascending`** order of the **`Category`** using the **`ToString`**() method of **`class Product`** . Evaluate the LINQ statement inside the method and run the method to test the execution.

Expected sample output



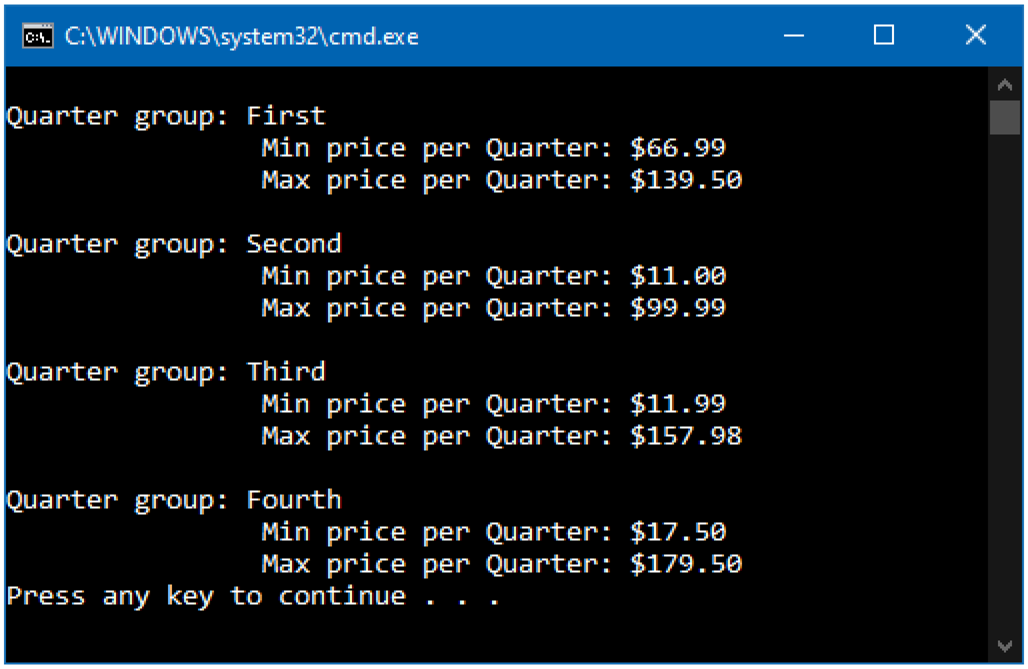
```
Quarter group: First
        Category group: F
                F000005: 35, 72, 91, 70
                F000010: 94, 92, 91, 91
        Category group: M
                M000009: 75, 84, 91, 39
                M000012: 96, 85, 51, 30

Quarter group: Second
        Category group: F
                F000003: 93, 92, 80, 87
        Category group: M
                M000002: 99, 86, 90, 94

Quarter group: Third
        Category group: M
                M000001: 99, 82, 81, 79
                M000007: 75, 84, 91, 39

Quarter group: Fourth
        Category group: F
                F000006: 88, 94, 65, 91
                F000008: 97, 92, 81, 60
        Category group: M
                M000004: 97, 89, 85, 82
                M000011: 96, 85, 91, 60
Press any key to continue . . .
```

e) Write a method

```
public static void GroupByQtrMinMaxPrice()
```

to declare a LINQ statement that groups **`products`** by **`Quarter`**. The Quarter groups must be sorted in **`ascending`** order of the **`Quarter`** and each **`Quarter`** group shows the **`Min`** and **`Max Price`** per **`Quarter`**. Evaluate the LINQ statement inside the method and run the method to test the execution.

Expected sample output



```
Quarter group: First
                Min price per Quarter: $66.99
                Max price per Quarter: $139.50

Quarter group: Second
                Min price per Quarter: $11.00
                Max price per Quarter: $99.99

Quarter group: Third
                Min price per Quarter: $11.99
                Max price per Quarter: $157.98

Quarter group: Fourth
                Min price per Quarter: $17.50
                Max price per Quarter: $179.50
Press any key to continue . . .
```