Assignments

.NET

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Getting Started with C#

Sr. No.	Assignment Question
1.	The **University of Venice** is a well-known educational institute in **Italy**. It is a university which has produced top professionals for many decades. The establishment is an autonomous organization covering many branches of teaching. In the recent years, the university has increased the administrative costs by about 40 percent. The administration has explained that the hike in cost is because of the changes that the management is going to bring in after the recent study. The changes would mainly focus on the replacement of administration facilities for the growing faculty and the students.
	In order to bring in transparency, the management decides to display the details of all the alterations to the students through an application. Thus, when the students will have access to view the details at any point of time, they need not speculate about possibilities of rising fees, as they can see the details for themselves. In this manner, the management can make it easy for students to know about changes planned in the university.
	Also, as the new academic year has begun, many youngsters will want to browse for the available branches and courses.
	Using `WriteLine()` methods of C#, display the details of administrative changes and the list of branches to the students. You can assume any information for this.
	Test the output by compiling the program and executing the same through Visual Studio IDE.

Variables and Data Types

Sr. No.	Assignment Question
1.	**Atlantis Scientific Systems** is an advanced scientific computation lab in **Colorado**. The staff of this lab gathers data on various elements and phenomena and performs vast amount of scientific calculations and research on the accumulated data. This will help them to reach specific conclusions which they can publish in journals and papers across the world. Assume you are one of the researchers at **Atlantis** and have to gather and store the following data given as input: ❯ Minimum Temperature of the locality ❯ Maximum Temperature of the locality ❯ Average Temperature of the locality ❯ Population of the town ❯ Population of the state ❯ Whether the city is a metropolis or not (true/false data) ❯ Average literacy percentage of the city ❯ Average qualifications of the population (Graduate, Postgraduate, and so on) You decide to write a C# program that can help you do this. Test the output by compiling the program and executing the same through Visual Studio IDE.
2.	**Garcia Infosystems** in **Spain** is computerizing the local school information, primarily comprising the records of students studying in the school. Towards this end, they need to store various kinds of data about the students. Assume that, you are one of the staff at the school performing data entry into the database of **Garcia Infosystems** and need to enter the following information: ❯ Student Name ❯ Student Age ❯ Gender ❯ Date of Birth ❯ Address ❯ Father's Name ❯ Mother's Name ❯ Father's Occupation ❯ Spanish Citizen (true/false) ❯ Student Grade ❯ Division ❯ Major Subject You decide to write a C# program that can help you do this. Test the output by compiling the program and executing the same through Visual Studio IDE.

Statements and Operators

Sr. No.	Assignment Question
1.	**TRON EXPRESS** is a full-time logistics agency for corporate companies around the world. It mainly deals with delivering and tracking the packages. **TRON EXPRESS** has its annual budget session during the end of year. The company has more than 30,000 full-time employees, 5,00,000 customers per month, and an average of 3 million packages a day. The company decides to discuss about its annual profit. The first point under consideration is about the pay structure to the employees. The company pays differently to both permanent as well as temporary staff. To avoid any kind of differences, the company pays each employee on different criteria. Some of them are as follows: 1. **Number of packages being delivered**: Every employee gets $50 for every package they deliver. 2. **The distance they travel**: Every employee gets a daily allowance of $75 for their travel. All extra charges can then be reimbursed. 3. **Shifts**: People who work in the night shift, get an extra pay of 10% more than people working in day shift. 4. **Feedback**: Finally, the employees' performance is also based on the feedback from the customers. Depending on all these factors, the pay structure is decided after all the tax deductions. The deductions are mainly classified according to the grades and level of seniority. The deductions can be for income tax, medical claims, or loans. Secondly, their point of concern is the costs on the call centers. All the call center professionals call their customers frequently to ensure the tracking of their packages. Thirdly, the costs are also mainly due to electricity, packages, and others. Given the mentioned information, use all possible statements of C#, expressions, and operators and design a program to help the management to calculate the annual budget. After the calculation is done, display the relevant details of each department separately to all its viewers. Test the output by compiling the program and executing the same through Visual Studio IDE.

C# Programming Constructs

Sr. No.	Assignment Question
1.	**Detroit United Bank** is a leading banking organization in **US** with its headquarters based in **New York**. It has operations across 20 countries. With the ever growing customer base across the globe, the organization officials have thought of creating a console-based application in C#, which would completely automate their day-to-day work in the bank. With this console-based .NET application, a customer can also perform transactions such as changing the user name, withdrawing money, depositing money, and viewing his account details.

The features of the banking application are as follows:

- Open a Bank account
- Perform transactions for an account
- Exit the application

The system has a feature called 'Perform transactions for an account' in which a customer is allowed to perform transactions in his account. The following options are supported in this section:

- Deposit money in his account
- Withdraw money from his account
- Change the owner name
- Display the number of transactions and closing balance
- Exit from the application

a) Create a console-based application in C#:
- Declare variables **name, age, address** to store the name, age, and address of a customer respectively. Declare variables **balance** and **transactions** to store the balance in an account and the number of transactions.
- Using the `switch-case` statements of C#, create a menu that should display the following commands:

Commands	Operation
open	Open an account
account	Perform transactions on an account
quit	Exit the application

- On typing 'open', the user is allowed to enter the name, age, address, and the starting balance of the customer. On successful opening of an account, display a suitable message.
- On typing 'account', a menu having the following commands should be displayed:

Commands	Operation
deposit	Make a deposit
withdraw	Make a withdrawal
show	Show the number of

	transactions
quit	Exit the ATM

       b) Declare variables **depositAmount** and **withdrawAmount** to store the amount to be deposited and withdrawn from the account. The variable **newBalance** stores the closing balance of an account.

       c) Use iteration statements to create this menu, so that the user is not allowed to exit the menu unless and until 'quit' is entered.

2.   **Salisbury University** is an accredited **European** university, which offers a range of courses to its students. It strives to give students the very best in terms of education and course content.

Now, the university management is introducing a new IQ testing system for its MBA students, which is an add-on to the traditional examination system. This tests the IQ of the students by testing them on four different subjects such as Aptitude, English, Mathematics, and General Knowledge.

Consider yourself to be a part of the software development team that is supposed to design the application in C#. First, the application asks the student the number of attempts. If student responds with a value higher than 1, then the application terminates and displays a corresponding message. However, if the student is attempting the test for the first time, it displays the following menu:

1. Aptitude
2. English
3. Math
4. GK
5. Exit

On entering a value between 1 and 4, the application displays the corresponding question. Note that, the student can attempt only once for each subject listed.

When a student enters the correct answer for the question, the score for that subject gets incremented by 10 points. Once the student appears the test for all the subjects, he/she can choose to exit the application. After selecting the **Exit** option, the student can get the total marks printed on the screen.

The total scores should be calculated by adding up all the individual scores in each subject. Next, the application displays the following based on the score:

1. Bonus points earned
2. Total score out of 50
3. Message on IQ level

The application displays the bonus points based on the following conditions:

a) No bonus point is given, when the total score equals to 10.
b) A bonus of 2 points is given, when the total score equals to 20.
c) A bonus of 5 points is given, when the total score equals to 30.
d) A bonus of 10 points is given, when the total score equals to 40.

The message on IQ level is displayed on the basis of following conditions:

a) If the final score equals 10, then a message is printed saying 'Your IQ level is below average'.
b) If the final score equals 22, then a message is printed saying 'Your IQ level is average'.
c) If the final score equals 35, then a message is printed saying 'You are intelligent'.
d) If the final score equals 40, then a message is printed saying 'You are a genius'.
e) If the final score equals 0, then a message is printed saying 'You need to re-appear the test'.

Arrays

Sr. No.	Assignment Question
1.	**Idaho Avalanche Information Centre** in **US** decides to conduct an awareness program on avalanches for all the local civilians. Their aim is to provide all the necessary information on weather, so that the loss to economic and human mankind can be avoided due to avalanches. **Idaho Avalanche Information Centre** especially feels that every skier should be aware of the local weather conditions. Though the weather related information is available in many Websites, it becomes difficult for the common man to read the data present in different formats and files. This problem becomes even worse, if the person is staying in bad weather conditions. Therefore, the Technology group of **Idaho Avalanche Information Centre** decides to collect the data at one place and present it to the people. Their goal of providing public education starts from the collection of information about all the **avalanche centers in Idaho**. a) Using the concept of multi-dimensional arrays, create three arrays named **Sun Valley**, **Panhandle,** and **McCall**. These three arrays store the climatic conditions of the corresponding places. Add minimum of five instances in each array, which stores information on the **Date**, **Time**, and **Temperatures in ^{0}F**, **Humidity %**, **Average Speed of Wind,** and the **Direction of the Wind in Degrees**. b) Using the methods and properties of `Array` class, make a comparative study on the various recordings. Depending on the observations made, display which places are safe for skiing. c) Finally, assuming that examples are more effective, create a jagged array, **Accidents** that lists all the accidents that has taken place during the past 10 yrs. This array should also consist of the rescue methods and survivals that are present, if any.

Classes and Methods

Sr. No.	Assignment Question
1.	**Noertis Pharma Ltd.** is one of the top five pharmaceutical companies in **Sweden**. They maintain records to store medicines and sales details. Earlier, they used to store all these information in ledgers and files. In the recent years, they have found that this approach of storing information takes up a lot of physical space. In a move to conserve space and preserve data long term as well as reduce the effort required to maintain the data, **Noertis Pharma** has decided to shift to an automated data management system using .NET and C#. You are recruited as one of the chief programmers for this task and need to implement the following: a) Create classes for **Medicine** and **Sales** Medicine details that will be stored are as follows: 1. Medicine Code 2. Medicine Name 3. Manufacturer Name 4. Unit Price 5. Quantity On Hand 6. Manufactured Date 7. Expiry Date 8. Batch Number Sales details that are to be stored include: 1. Medicine Code 2. Quantity Sold 3. Planned Sales 4. Actual Sales 5. Region b) Each class should use the concept of constructors to initialize the data. c) **Accept()** method in each class should accept the data from the input and store the same into respective fields. d) A method **Print()** will be written in **Medicine** class to display all the details of medicines. Another method of the same name should be written for a different action, to display quantity on hand for a particular medicine whose code will be supplied to the method. Yet another **Print()** method should be written to display expiry date and manufactured date for a medicine whose code and name are supplied. e) A method **Display()** will be written in **Sales** class to display all the details of sales done. Another method of the same name should be written for a different action, to display difference between actual sales and planned sales for a particular medicine whose code will be supplied to the method. f) Assuming that a fresh order of medicines has arrived for those medicines

whose quantity on hand was zero, write a method to increase the quantity on hand for each of these medicines by 50.

g) Create a **Test** class to create objects of each of these two classes. Compile the test class and execute the same through Visual Studio IDE.

Inheritance and Polymorphism

Sr. No.	Assignment Question
1.	**Inherit Army Medical Centre (AMC)** conducts surveys on thousands of people every year and submits the reports to their reporting authorities. The building of **AMC** occupies an area of more than 100 acres of land and is a five storey building situated in **Inherit**'s 50 mile area. Their main focus of **AMC**'s healthcare unit is army level disease management. The medical unit manages the health issues of the army troops of its state. They primarily administer the medical health history of the military personnel, identify the problems of individuals, attempt to cure it, and submit the readiness report to the commanding superiors.

The software that helps them for this cause is known as **Inherit Medical Toolkit (IMT)**. This software includes features such as:

    a) Number of active troops which includes details such as:
      ➢ Names of the personnel
      ➢ Posted locations
      ➢ Number of groups in each location
    b) Total number of personnel
      ➢ Names of the personal
      ➢ Personal information of each staff
      ➢ Health history of each person
    c) Medicines available
      ➢ Total number of medicines available
      ➢ Names of the medicines
      ➢ Expiry dates of the medicines
      ➢ Status of the medical team in each location

Last year, the local NGOs and **Government of Inherit** unanimously decided to extend their medical service to all the retirees and the family members of the military forces in **Inherit**. They decide to provide a reduction in the medical costs provided to all the members of the family who lost their near and dear ones in the wars. The discount on the prices depended on the ranks of the concerned person. They also settle down to provide free medical service to the **Inherit**'s citizens who are more than 75 years of age.

To implement all the advances taken by the government, the **IMT** should now consist of information that is related to:

    d) Number of family members of each military personnel
      ➢ Number of children
      ➢ Number of working professionals
      ➢ Number of old people
    e) Number of retirees in Inherit
      ➢ Names
      ➢ Posted locations
      ➢ Ranks when retired
      ➢ Date of birth
      ➢ Health history

    f) Number of people expired |

> ➢ Names
> ➢ Posted locations
> ➢ Ranks when retired
> ➢ Number of family members who were dependent

Therefore, using the concepts of inheritance and method overriding in C#, create a program that helps **IMT** to update with the latest developments.

Finally, to boost the self-confidence of the local people, the NGOs decide to give a regular checkup for all the people who are suffering from diabetes and cardio vascular problems. So, using the concepts of derived classes, update the software that helps the staff members to keep track of people suffering from these diseases.

2. **Coolhorse.com** is a music Website that was launched five years back. This Website displays the information of all songs present in every private album and film. Keeping in mind the privacy issues, **Coolhorse.com** has a feature of allowing the user to login and then, access the Website. The user after successful login can either listen to the songs online or can download the same of his/her choice. This Website categorizes the music into:

    1. Songs
        > ➢ Albums
        > ➢ Films
        > ➢ Artists
        > ➢ Lyrics
        > ➢ Language
        > ➢ Country
    2. Karaoke
        > ➢ Instrumental
        > ➢ Artists
        > ➢ Country

    The software used the concepts of inheritance created classes **Songs** and **Karaoke.** The derived classes were **Albums**, **Films**, **Artists**, **Lyrics**, **Language,** and **Country** in **Songs**. The derived classes in **Karaoke** were **Instrumental**, **Artists,** and **Country**. The derived classes also had the costs of the individual DVDs and CDs.

    To improve the user interactivity, this Website also presents the users with downloadable icons, smileys, and opinion casting ads.

    Since the staff of **Coolhorse.com** was not from a technical background, the management of **Coolhorse.com** dedicated the task of developing this Website to software company **Infonizant Consultant Services** five years ago.

    After the Website was launched, it became a great hit amongst the youngsters. Unfortunately, in the feedback section, the concerned staff noticed that many people complained about the inadequate knowledge about the song they want to download. Listeners felt that the data that is provided only mentions the name of the song with its respective artistes. Since no information is provided on the size of the song, duration, and its encoding type, it sometimes creates a problem while downloading.

Therefore, the management feels that an immediate action has to be taken and approach to **Infonizant Consultant Services (ICS)**. Assume yourself to be the part of the team in **ICS** and update the Website with the given requirements of the client. As **Coolhorse.com** does not want any details that are already present to be changed, use the concepts of `sealed` class to design **Songs** and **Karaoke** and avoid alterations. To show the required information, create a class **Details** and proceed with the action statements to create objects and invoke methods.

Abstract Classes and Interfaces

Sr. No.	Assignment Question
1.	**Blueprint Garments** is into production of garments for the past decade. Their products include a range of casual wear, formal wear, and day wear. The clothes that are designed for women are available in both knits and woven. **Blueprint Garments** are also into designing basic men's wear and children's wear. They have a record of crossing 1000 million dollars in sales every year. However, this year, they found their sales reducing.

The sales team of **Blueprint Garments** was made to give a presentation to the top management as the audits were nearing. During the presentation, it was decided by the Training department to hire an expert and do the analysis of sales. The analyst had to categorize the sales area wise. For example,

➢ **A**: All the places who bring in the maximum sale.
➢ **B:** All the places that bring in average sale.
➢ **C:** All the places who were responsible for low sale.

Apart from this, as the quality was questioned, the team was made to list the clothes and the fabrics they produce. It was again divided into:

➢ **Trend Setting Garments**: These garments mostly used the following:

❖ Cotton Polyester
❖ Rayon
❖ Linen
❖ Satin
❖ Georgette
❖ Moss Crepe
❖ Net
❖ Lace
❖ Jacquard Velvet

➢ **Climate Control Garments**: These garments mostly use knit fabrics using different thickness of wool depending upon the severity of the winter winds. As the climatic conditions are extreme, they deal with the development of:

❖ Heated clothing
❖ Wind Resistant Upper clothing

➢ **Sports Garments**: These garments must be designed keeping in view the various properties. The clothes designed specifically for sports should protect the users against heat loss, over soaking, and should have high durability. They should also be comfortable for the users. These kind of clothing include materials such as:

❖ Viscose Cotton
❖ Flax
❖ Wool
❖ Hemp

❖ Ramie
❖ Silk
❖ Lyocell and so on.

Though they are different varieties of garments, the basic collection ranges from skirts, trousers, jackets, blouses, tops, dresses, and shirts.

Therefore, as a software professional, use the concepts of `abstract` classes and develop a program which will help the core team of **Blueprint Garments** to do the presentation and audit successfully.

Using the concepts of `abstract` classes and its implementation, create an `abstract` class, **Clothing** and its `abstract` methods include **Sales**, **Materials, CommonWear**. Also, derive subclasses, **TrendSetting**, **ClimateControl**, **Sports** and display the required information in detail. The `abstract` method, **Sales** implemented in the derived classes should display the names of regions that are categorized accordingly to the sales produced this year.

The Zoology department of **Microdoc College** in **Michigan** plans to give a presentation for the second year students who want to do their research in the life of elephants. Since, the presentation is in a week, the Zoology department takes the help of the Computer Science department in their college to prepare software that helps with their demonstration. The Zoology professor gives the following information about the elephant to the Computer Science students:

a) **Species**: The African and Asian elephants are separate species. African elephants are found in 38 countries of Africa and stand up to 4 m and weigh around 7000 kgs. Asian elephants are 3.4 m tall and weigh 5,400 kgs.
b) **Body Characteristics**:
   i. **Trunk**: Is used to tear up their food and then, place it in their mouth.
   ii. **Tusk**: Used to dig for water, salt, and roots; to debark trees, to eat the bark; to dig into baobab trees to get at the pulp inside; and to move trees and branches when clearing a path.
   iii. **Teeth**: They usually have 28 teeth.
   iv. **Skin**: It is extremely tough around most parts of its body and measures about 2.5 cm (1 in) thick.
   v. **Legs and Feet**: They are great straight pillars, as they must be to support its bulk weight.
   vi. **Ears**: Elephant ears are made of a very thin layer of skin stretched over cartilage and a rich network of blood vessels.
c) **Diet**: Elephants are herbivores, spending 16 hours a day collecting plant food.
d) **Reproduction**:
   i. Females give birth at intervals of about every 5 years.
   ii. At birth, calves weigh around 90–115 kgs.
e) **Domestication**: Elephants have been working animals used in various capacities by humans.

Consider yourself to be a Computer Science student and develop the front-end with the given back-end details for this scenario. Using the concepts of multiple

interfaces with inheritance and their implementation, create interfaces **Species**, **Body Characteristics**, **Diet**, **Reproduction**, and **Domestication**.

Declare the following methods in these interfaces:
- a) Species
  - a. **African**
  - b. **Asian**
- b) Body Characteristics
  - a. **Trunk**
  - b. **Tusk**
  - c. **Teeth**
  - d. **Skin**
  - e. **Legs**
  - f. **Ears**
- c) Diet
  - a. **Herbivores**
- d) Reproduction
  - a. **Interval**
  - b. **Weight**
- e) Domestication
  - a. **Use**

Create a class **Elephants** and implement the interfaces and their methods. Display the information.

Properties and Indexers

Sr. No.	Assignment Question
1.	**Fargo Overview** is a leading company in ATM Banking. It has its headquarters in **New York** with 2,00,000 employees. The company provides financial products and services ranging from banking, insurance, and consumer banking. **Fargo Overview** also has 7000 ATMs throughout **US**.

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In recent years, **Fargo Overview** was planning to convert its entire network of ATMs to Microsoft Windows Platform. They decided to make their machines Web-enabled, so that the functions are in sync with the bank's other operations. Also, a Web-enabled platform also offers advantages such as faster processing times, an interactive user interface, and more up to date information compared to the traditional ATMs.

Fargo Overview plans to make use of the following value-added features:
  a) Get the cash
  b) Deposit the checks
  c) Deposit the cash
  d) View the balance and corresponding statements
  e) Donate the funds to charity for tax redemption
  f) Transfer the money to other accounts
  g) Buy the stamps
  h) Users Preferences

Apart from these features, the GUI consists of other options which are as follows:
  a) Change the language
  b) Return the transaction receipt
  c) Return the card

The software department of **Fargo Overview** was given the task to make an interactive GUI and submit it to the respective top management. On approval from the higher executives, the design will be treated as the protocol and the corresponding front-end and back-end will be developed.

Consider yourself to be the lead of their software team and develop a console-based application. Using the concepts of properties in C#, develop a program which has labels for:
  a) Get Cash
  b) Deposit Checks
  c) Deposit Cash
  d) Balance Statements
  e) Donate to Charity
  f) Transfer
  g) Purchase Stamps
  h) My Choices

Using the concepts of format specifiers, try to arrange all the features in a professional style.

Arrange the mandatory features in the same manner and name them as follows:
   a) Change Language
   b) Return Receipt
   c) Return Card

2.   **Authentic Supermarket** carries only foodstuff of great quality and tastes. It is a self-service store located in **Idaho**. It is located near the residential quarters of **Idaho** and covers an area of 50 acres. This supermarket consists of all kinds of foodstuff which includes baking supplies to cereals. One of the greatest advantages that people find in **Authentic Supermarket** is the availability of all the grocery under one roof and ease of adequate parking during the entire 24*7.

   Authentic Supermarket is into this service for the past five years. In order to beat the competition of the new markets that are being developed now, **Authentic Supermarket** has come up with the feature of home delivery. In the home delivery system, the customers can call up the operators and ask for the relevant product, its details, and order for the same. The product that has been ordered should reach the customer within thirty minutes.

   Though many people were hired as telephone operators, delivery executives, and the staff in **Authentic Supermarket** did face some problems. For example, when a customer calls up an operator to know the rate of Corn Pasta named 'Eliche', he/she has to go through the entire records. As this is time consuming and every consumer may not be patient to wait long, the group which has developed the software resolves to modify the program using indexers.

   Being a software professional from the corresponding group, use the concepts of properties and indexers and update the program. Using the ideas of multidimensional and jagged arrays, display the output in a professional manner. The input that is given is as follows:

Name	ID	Rate/Kg
Cake Mixes	AUT101	90
Cookie Mixes	AUT102	100
Sweeteners	AUT103	100
Natural Flavors	AUT104	200
Corn Flours	AUT105	150
Rice Flours	AUT106	175
Corn Pasta	AUT107	180
Rice Pasta	AUT108	195
Snacks		100
Cereals	AUT110	50
Salad Dressings	AUT111	30

Namespaces

Sr. No.	Assignment Question

1.	**Section Inc.** is into providing health care services since 1980. They are dedicated for greater access to human and animal health in various fields. Their aim is to make their company a global leader in the field of medicines, consumer products, and corporate responsibility. In order to fulfill their aim, **Section Inc.** is in a continuous process of discovering new high quality medicines. **Section Inc.** work with different individuals, government agencies, and organize seminars and free medical checkups.
	
	As **Section Inc.** always develops new medicines, they want their employees to be thorough about the things happening in the field of medicines. Therefore, they conduct many internal competitions and exams, so that their employees have knowledge of all the drugs. They also conduct internal examinations for all the people who have been recruited recently.
	
	For one such online test, the Senior Training Manager decided to bring in a change of question paper. Therefore, the training team gave their suggestions to their e-learning company that handles the Online Examination department of **Section Inc.** The suggestions of the training team included to make changes which was as follows:
	
	  a) Display the rules in the home page.
	  b) Divide the questions into categories such as easy, middle, and difficult.
	  c) As some of the questions are a must for each employee to know, categorize them into mandatory.
	  d) Mention the marks for each category of questions.
	  e) Specify the time for each category of questions.
	  f) Display the team which the medical professionals represent.
	
	Assume that you are a member of the e-learning team. Therefore, it becomes your responsibility to change the design. Using the concepts of system-defined namespaces and custom namespaces:
	  a) Create namespaces **Easy**, **Middle**, **Difficult**, **Mandatory**, **Rules**, and **Team.**
	  b) Create methods **Marks**, **Time**, and **NoOfQuestions**.
	  c) Create a main method named **OnlineTest** and display all the details that are mentioned here.

2.   After the first round of **User Acceptance Testing (UAT)**, the Head of Training department is not satisfied with the end product and asks the team to make more changes. The training team then decides to make the following changes.

   a) Group the questions in each category according to the common attributes.
   b) Mention the URL of the site for all those questions that are very difficult to attempt. Cite a minimum of five URLs for reference. In this case, the administrator should block all other sites other than those mentioned for citation.
   c) Display the region in order to know the region that the concerned person is representing.

Being the same member of the e-learning team who developed the earlier design, try to implement the changes using the concepts of nested namespaces and namespace aliases.

Create nested namespace **Category** under each namespace, such as **Region** under the **Team** namespace, and create **Reference** under the **Difficult** namespace. Also create appropriate methods to display the details. The namespace **Category** should again be categorized into questions that were pertaining to diseases, chemical composition, and the places in which the medicines are mostly used. Therefore, create nested namespaces **Diseases, ChemComposition,** and **Areas** under each category.

After creating the nested namespaces, display the required details.

Exception Handling

Sr. No.	Assignment Question
1.	**Jordan Hotel** is an extremely popular location in one of the biggest tourist destinations of the world. It is one of the most sought after locations in **Las Vegas**. It has state-of-the-art fine art collection, rooms, delicious and quality creating caterers, and the cheapest travel agency in and around **Las Vegas**. The caterers that **Jordan Hotel** provides specialize in contemporary American and International cuisine. Though it is popular among the civilians, it wants to make a mark in the society of **American Group of Hotels**. It plans to go in for quality certifications. Before finalizing on any step towards excellence, different departments of **Jordan Hotel** were asked to do a thorough revision of the corresponding software. Starting from the Accounts department, it is found that when the operator is preparing the bill invoices, he/she had to enter the data accurately. Their pricing machine will not indicate the errors that are caused while entering the details. The common error that is caused while entering the price in pounds and dollars. Therefore, using format specifiers modify their application with an exception **MessagePrice** and then, display the message saying 'Input is not in the correct format.' In the Caterers department, the employee has to search manually in the list of venues from their application. This becomes a problem whenever a client gives a telephonic order for gala events such as wedding, personal, and corporate celebrations. Therefore, using the concepts of arrays and indexers, add an exception **Venues** and then, display the message saying 'Service is not provided in this location.' The caterers in **Jordan Hotel** offer their service throughout the following locations: a) Connecticut b) Westchester c) Rhode Island d) Massachusetts e) New Haven County f) Fairfield County g) New Corner County h) Lyman Orchards i) Yacht Clubs j) Cheshire k) Rectrk l) Hawaii m) Tieming n) Coln o) Wordment p) Portland Finally, the Travel department of **Jordan Hotel** is in the business of providing many vacation packages. On account of of the constantly changing airfares and

schedules, the employee has to provide vast amount of information to the people. However, unfortunately, their software does not provide the customers with the information about the vacancies left in the hotels that they want to go. Therefore, qualify their software by adding an exception **VacanciesLeft.** It should display the message saying 'No more rooms available.' by using the concepts of jagged arrays.

2.   **Assign Software Ltd.** is into developing banking solutions. Their latest agreement is with **Bank of Columbia** to prepare the software for ATM Banking. Since the development is in the last stage, the modules that are yet to be prepared are:

1. To check the invalidity of the pin number
2. To check the invalidity of the card
3. To check for the insufficiency of fund

Therefore, assuming that you are a team member, develop the last module using the concepts of nested and custom exceptions. Develop the program which has the following exceptions and corresponding messages to indicate the user.

Exception 1: **InvPinNumber** with the message 'Invalid Pin Number'.
Exception 2: **InvCard** with the message 'Card has expired.'
Exception 3: **InsFund** with the message 'Insufficient Fund.'

Let Exception 1 be the outer exception and the remaining exceptions be the inner exceptions. Display the messages in the corresponding **catch** blocks. Using **finally,** display the message when the transaction is successful.

Using the concepts of jagged array, create an array with a minimum of 5 records. The data should include **CustomerName**, **PinNumber**, and **ExpiryDate** that shows the **Date of expiry** of the card in the date format and **Balance**.

Events, Delegates, and Collections

Sr. No.	Assignment Question
1.	**Article Limited** is a credit bureau in **Appleby, Texas**. It provides credit information on individual borrowers. A credit bureau is also referred as Credit Reference Agency. Companies such as **Article Limited** are a complete profit entity and have no affiliation with any government agency.

The information that this company provides is very helpful for people who lend money to others. It facilitates the lenders with information such as the ability to pay the load, and the interest rates etc.

The financial information provided by **Article Limited** is provided to all the companies, agencies that request it, in order to do the credit assessment and credit rating. **Article Limited** collects personal financial data about the individuals from all the fiscal societies with which the company has a relationship.

The financial statistics that **Article Limited** provides, tests the odds that an individual will be able to repay the given debt. Using a mathematical algorithm, they summarize the statistics and render the same to the clients.

For one such client, **Article Limited** has to prepare an algorithmic rule that is developed on the end result of various kinds of interests. The interest is computed for a group of people who have borrowed money.

Therefore, as a coder, develop a software that calculates the following:

➢ Simple Interest
➢ Compound Interest
➢ Real Interest

Using the concepts of C# delegates,

1. Create a jagged array **Customers** that holds the details of minimum of 2 customers.
2. Declare a delegate **Interest** and instantiate the same.
3. Declare variables such as:
   - P for storing principal amount
   - R for storing rate of interest
   - T for storing the time
   - I for inflation
   - N for storing the number of years
4. Declare three methods **SimpleInterest**, **CompoundInterest**, and **RealInterest.**

The formula for the same are as follows:

- Simple Interest: P*T*R
- Coumpound Interest: (P*N*R/100)

- Real Interest: Nominal Interest Rate-Inflation

2.   **Crazy.com** is a Website in which people of all the ages can play different types of video games. Its GUI is represented in a form that all the new games are shown on the left side, the top downloads of games on the right side and the latest news in the field of video games is in the middle. It has a section exclusively for searching a game.

Crazy.com, in one of its new innovation of games, has come up with the idea of a game called Racey. It is a game in which the racer has to overcome obstacles such as opponents, bumps, civilian traffic, and so on. As and when the racer crosses his 10 obstacles, a message is notified to the user of the video game that is he/she is moving to the next level. At the same time, if the user crashes three times, the user is notified that he/she is disqualified.

As a programmer, implement these ideas using a console-based application in C# and the concepts of events and delegates. With the help of different functions, methods and properties of arrays create a program which has its events **Successful** and **Unsuccessful**. Display the appropriate messages as given here.

3.   **Henderson Public School** is into educational service for the past two years. It has a large campus with thousands of students. The school has three buildings and each is allocated to primary, higher, and labs correspondingly. The school has basic necessities such as auditorium, office, library and so on. In the span of two years, the school has produced many top ranked students in the state.

The school decides to conduct a science exhibition this year. The top authorities of the local government have been asked to attend the 5-day function. Since, the exhibition consists of more than 100 exhibits, the staff decided to use a projector and guide the public to the required locations. Apart from that, the Principal of the school also wanted to display the top rankers of the school in the past two years.

Therefore, assuming that you are a computer staff member,
   a) Use the concepts of `ArrayList` class and create a multi-dimensional array collection which displays the details:
   ➢   The name of the exhibit
   ➢   The name of the person who has created it
   ➢   The name of the subject
   ➢   The floor on which the exhibit is displayed
   ➢   The name of the building considering the school has three buildings named **Primary**, **Higher,** and **Labs**.

Add a minimum of 15 records and display the same. At the last moment, one such student fails to attend the exhibition as he is not feeling well. Therefore, using the method `RemoveAt()`, remove a particular record at the desired index location.

   b) Use the concepts of `Hashtable` class and display the following:
   ➢   Name of the top rankers in the past two years.
   ➢   Percentage and year in which they have scored the highest.
   ➢   Name of the people who scored highest in each subject in the past two years along with their marks. Also display their subjects.
   ➢   One of the students whose name is already displayed for being a topper

last year has got admission in one of the top colleges of the state with a tremendously high score. Using the `ContainsKey()` method, display the appropriate message.

4.   **Media Limited** is a learning solutions company with a presence across 10 countries. The company helps the individuals in adapting themselves to the changing knowledge requirements of the fast growing world. The company is ISO certified for providing quality education services support since 1990.

Every year, the company lists the names of people who got promotions. This task is done manually. This, in turn, created many problems during communication. To overcome this problem, the IT department of **Media Limited**, has created software that displays the list of employees who have promoted after each appraisal. After creating the list, it is forwarded in the company's intranet, so that other people can be updated about the latest happenings in the company.

As software executive of this company, develop a program that uses `SortedList` class and `Dictionary` generic class. Create a `Dictionary` generic class and using the `Add()` method, add the following details:

Name	Department
Tom Lee	Training
James Anderson	HR
Michael Chan	Content Development
Jackie Jackson	Training
Bruce Douglas	Graphics
Kim Date	HR
Joseph Mathews	Content Development
Rose Dorson	Marketing
Andrews Stephan	Graphics

To avoid any discrepancies in the list, use the methods and properties of `SortedList` class and display the records in an alphabetical order.

After the program is developed, it is verified against the checklist given by HR. Later, you find that Andrews Stephan of Graphics department has left the company. Therefore, using `ContainsValue()` and `Remove()` method remove the corresponding record.

Generics and Iterators

Sr. No.	Assignment Question
1.	**Paramount Research Library** provides extensive collection of books to the students and staff of **Research University**. The **Research Library** becomes an important exploring tool around for all the current students who hold the **Research University** IDs. The books in **Paramount Research Library** are mainly categorized into the following: ➢ Archaeological ➢ World Music and Poetry ➢ Art ➢ Historical Collections ➢ Medical Science, Population Science, Environmental Science ➢ Teaching and Learning ➢ Photography ➢ Film and Theatre ➢ Law The library is open during weekdays from 9-5 pm and is closed on weekends. However, if there is any examination that is fast approaching, the library will be open on special request. The events in the library are updated every weekend. The deadlines for closing all the accounts in the library are at the end of the corresponding academic year. Since the university has its population increasing year by year, the librarian requests to prepare software that will help the library staff to settle the accounts. Therefore, the IT team of the university thus decides to help the librarian by creating software that uses the concepts of **Generics**. The details that were given to the software team are as follows: a) Name of the student b) Year of study c) The book that the student has taken: ➢ Name of the book ➢ ID of the book d) The date on which the book was issued e) The date on which the book is to be returned f) Name of the students who haven't returned the book ➢ Name of the book that was not written along with the ID of the book Hence, use the idea of interface **IDefaulterList** to declare methods in C#: a) **GetName()**: To get the name of the student. b) **GetYear()**: To display the year in which the student is working. c) **GetBook()**: To get the details of the name and ID of the book. d) **GetDateIssue()**: To display the date when the book was issued. e) **GetDateReturn()**: To display the date when the book is supposed to be issued.

    f) **GetDefaulter()**: To get the names of all the students who haven't returned the book. This method should also include the name and ID of the book that was not returned.

Now, create a class **Library** that will implement the interface **IDefaulterList**. Create a generic class **GenericDefaulterList** with the type parameter applied on the interface **IDefaulterList**.

Finally, create a main method in the class **UniversityLibrary** that will in turn create an instance for the class **GenericDefaulterList** that has its type parameter value as **Library,** since the class **Library** implements the interface **IDefaulterList.**

Display the required details in an orderly manner using format specifiers. Ensure that the date displayed is in appropriate date format.

2.   The **University of Aboutus** was established in the early 21st century. It is aimed at providing higher and quality education to all the adults.

In order to progress with their mission, the university plans to invest in digital resources such as virtual classrooms to all the final year students. The lectures will be provided from all the top people in different areas of industry. This will improve the learning and increase efficiency.

To progress with this plan, the Principal of the university conducts a meeting with all the staff members. The meeting was held with the agenda of finding the feedback from the students, so as to implement the idea of virtual classrooms. Since this is very expensive and the students might have to sacrifice their holidays, the Principal feel that all the students might not agree to it. Therefore, the Principal asks his Professors and lecturers to prepare a list and submit the same.

Different lectures make use of different media to show the data. However, the Professor of Computer Science opts to make use of the concepts in **Named Iterators** in C# to render the data.

Therefore, consider yourself as a Professor, utilize the concepts of **Named Iterators** and create a program with the following details

1. Create an array to store the names of all students in the class and name it as **studentNames**.
2. Create a multi-dimensional array with two columns in it and name it as **studentResponse**. The first column indicating the response of the student and the second to store the explanation for the same.
3. Create two array variables **GetStudentNames()** and **GetStudentResponse()** with the return type `IEnumerable`.
4. Use the concepts of `for` and `foreach` loop to display the required details in such a way that all appear beside each other.

Anonymous Methods, Partial Types, and Nullable Types

Sr. No.	Assignment Question
1.	The **Cyclonic Department of Atlantic Oceanographic and Meteorological Laboratory** is planning to take a seminar on the topic 'Tropical Cyclone' to civilians. Therefore, the department assigns its different teams with the task of collecting information on various stages of a tropical cyclone.

The various teams of the department were made to collect information on the following:

1. Composition
2. Warning Centers
3. Speed
4. Factors
5. Effects

As it is a seminar for the common public, the members were asked not to cover the topics in depth. Once the data and statistics are compiled, it is fed into software which uses C# as its front-end. This front-end is then combined with attractive GUI and presented before the public.

Assuming that the teams have done the job of compiling the data, as a module lead, you need to integrate the data.

❖ Create `partial interface` **ITropCyclone** and include its methods as following:

1. **Composition**: It accepts three `string` parameters named **componentOne**, **componentTwo,** and **componentThree**. The corresponding values for the same will be **Clouds**, **Wind,** and **Thunderstorms**.
2. **WarningCentres:** It accepts a single string parameter named **warnCentre**. The value for the same will be **Regional Specialized Meteorological Centers**.
3. **Factors**: It accepts six `string` parameters named **factorOne**, **factorTwo**, **factorThree**, **factorFour**, **factorFive**, and **factorSix**. These variables are assigned the values **Water Temperatures**, **Latent Heat**, **Troposphere**, **Wind Shear**, **Equator**, and **Coriolis Force**.
4. **Speed**: It accepts a single integer parameter named **knots.** The value **68** is assigned to it.
5. **Effects**: It accepts five `string` parameters named **effectOne**, **effectTwo**, **effectThree**, **effectFour**, and **effectFive**. The variables are assigned the values **Strong Winds**, **Storm Surge**, **Tornadoes**, **Eyewall Mesovortics,** and **Precipitation** respectively.

❖ Create a class **TropicalCyclone** and inherit the `partial interface` **ITropCyclone.**

❖ Using the concepts of delegates in the main method, display all the required

details. The messages that are displayed can be customized. For example, the message related to **Speed** can be written as 'The speed of a tropical cyclone will be > 68 knots'.

2. **Sleek Hospital** is a healthcare powerhouse where utmost care for life can be trusted. **Sleek hospitals** make use of all kinds of superior technology combined with century's old traditions of providing health care.

    Sleek Hospital has various categories of rooms which include General Ward, Double Sharing Room, Single Room, Deluxe Room, and Sleek Suite. Sleek hospital has a facility of a dietician who plans the diet based on the therapeutic needs of the patients. The other facilities include Guest Dining, House Keeping, Security, Gym, Transport, and Wellness Centre.

    Even after using such high-end technologies, **Sleek Hospital** fails to achieve the target of reducing the amount of time that outpatients wait for appointments or patients spend their time waiting in a trolley. They feel that the biggest hindrance to achieve their target is because of poor bed management.

    Consider the situation where all the patients in ICU units need continuous, intensive, and specialist nursing. However, a person in Accident and Emergency unit should be moved from trolleys to beds within four hours. In that case, it becomes difficult to move a patient out, who is already in the ICU. Therefore, this situation leads to bed blocking and impacts on quality of care and medical services as the critically ill patients are moved temporarily to other hospitals.

    As a result of this, the hospital management cannot ask the patients in other wards to move out earlier too. Rather, they plan to go in for increasing the number of beds they have. The management of **Sleek Hospital** gives an order to their dealer to provide 100 more beds.

    As software developer of **Quality Computer Solutions**, you have to update their existing software to show the increase in the number of beds and the different traders they deal with.

    Using the concepts of partial class and nullable types, create the following:

    1. Partial class **BedDetails** that has a method **Show()** to display the number of beds and the dealer. Ensure that the method also displays the number of beds that each category of rooms is having.
    2. Another partial class **BedDetails** in which its method accepts parameter to accept:
        ➢ Number of beds totally purchased
        ➢ Name of the dealer
        ➢ Number of beds that the department will be having, after new beds are bought

    Ensure that the number of beds purchased will be given as input to the program during runtime.

    Later, it was found that, another category of room will be used and was named **Special General Ward**. Since, no bed was allocated to these kinds of rooms earlier, assign a null value for the variable **SGWbeds** which stores the number of

beds to this category. It was subsequently decided that this category or rooms should have three beds, washroom, and an attendant's couch (each room). Therefore, enter the number of beds purchased as a default value to the nullable type **SGWbeds** and assign the same to a non-nullable type **newSGWBeds** using the ?? operator.

Advanced Concepts of C#

Sr. No.	Assignment Question
1.	**PizzaBud** is a leading pizza delivery store having outlet in more than 25 cities in the **United States**. A **PizzaBud** outlet accepts orders over the phone, online through their Website, and from customers who visit the store.
	With the objective of both increasing their customer base and leading the current competition in the pizza delivery business, the management of **PizzaBud** wants to introduce promotional discounts on orders of pizzas. The promotional discounts will be based on discount coupons that will have:
	❖ A discount code
	❖ The discount on the total order price in percentage
	Periodically, different discount coupons, such as festive discount, discounts specific to a city, discount specific to certain outlets, and discounts based on the order amount will be issued.
	PizzaBud is currently using an application that manages their operational processes. The application is based on the .NET Framework. Now, the management wants to develop a discount module and integrate it with their existing application.
	The discount module will use a database table to store discount records. This module will enable an employee of **PizzaBud** to insert and retrieve discount records.
	Assuming that you are in the team that has developed the existing application of **PizzaBud**, you have been assigned to create the discount module. You need to perform the following tasks:
	❖ Use the Entity Framework to create a **Discount** entity using the model-first approach.
	❖ Design the **Discount** entity with the following properties:
	➢ **DiscountID**, which is the key property
	➢ **CouponCode**
	➢ **DiscountAmount**
	❖ Generate the database.
	❖ Create a class **DiscountManager** class to perform the following functions:
	➢ Add records of a new **Discount** entity instance.
	➢ Retrieve all discount records sorted by **CouponCode**.
	➢ Retrieve a discount record based on **DiscountID**.
	All the database **INSERT** and **SELECT** operations in the **DiscountManager** class must be done using **LINQ**.
2.	**Park Plaza Entertainment**, also known as **PPE**, is a movie theater chain with its head office in **Knoxville**, **Tennessee**. PPE maintains 32 single-screen cinemas in

eight major cities of the **United States**.

At the start of every week, the **PPE** head office creates the list of movies that will be released in their cinemas. This list is sent to the cinemas both electronically and physically. Based on the list, each cinema updates their software application with the new movie records. The current manual intervention in managing the movie release list is inefficient and often results in incorrect records being circulated and recorded. Therefore, the management has decided to automate the process of managing the movie release list.

The management wants a solution that will enable an employee in the head office to record a movie release list. This list should be accessible from all the software applications currently deployed in the cinemas.

You, as a .NET application developer, need to provide the solution in the form of a Windows Communication Foundation (WCF) service. In the WCF service application:

❖ Create a service contract interface **ICinema** with the following operation contracts:
  ➢ **public void AddMovie(int cinemaId, String name, String cast, String director, float duration);**
  ➢ **public Cinema getMovieList(int cinemaId);**
❖ Create a data contract class, named **Cinema**. In the **Cinema** class, add the following data members.
  ➢ **CinemaID** of type **int**
  ➢ **Name** of type **String**
  ➢ **Cast** of type **String**
  ➢ **Director** of type **String**
  ➢ **Duration** of type **float**
❖ Create the service implementation class, named **CinemaService** that implements the **AddMovie()** and **getMovieList()** methods of **ICinemaService**.
❖ Create a console application client to access the WCF service.

Encrypting and Decrypting Data

Sr. No.	Assignment Question
1.	**Mobility Square** is a company that manufactures computer accessories. **Mobility Square** has appointed vendors who design the accessories for them. Before starting a design process, the engineering team of a vendor sends the design specification to **Mobility Square** for approval. Once the specification is approved, the design process proceeds. A primary concern of the management of **Mobility Square** is regarding the sensitive nature of the specifications. The management has realized the need to secure the specifications from any third-party access. Accordingly, **Mobility Square** has hired **Secure Vision**, an IT security consultancy service firm for a solution. **Secure Vision**, after gathering the requirements, has decided to create a solution by implementing asymmetric encryption to protect the confidentiality of the specifications. Consider that you are a software developer in **Secure Vision**. You have been assigned to create a prototype of the solution. For the prototype: ❖ Create a class with two methods, **EncryptData()** and **DecryptData()**. ❖ In the **EncryptData()** method, generate a key pair using the **RSACryptoServiceProvider** class. Then, use the public key to perform encryption. ❖ In the **DecryptData()** method, use the private key to perform decryption. ❖ Call both the **EncryptData()** and **DecryptData()**from the **Main()** method to test the functionality with some sample data.

--- End of Assignments ---