The exam is open book and open notes. You may not access a computer during the exam. The exam will be divided into three parts; part 1 will consist of short answer questions; part 2 will consist of programs which you will be asked to explain; part 3 will contain questions which require that you write one or more programs similar to the homework assignments.

Typical part 1 questions
1. Variables of type int are 32 bits long in C#. What is the range of the int variables?

2. What is wrong with the following code segment?
   ```csharp
   int i = 2, j = 4;
   if(i = j)
       Console.WriteLine("Variables are equal");
   else
       Console.WriteLine("Variables are not equal");
   ```

3. How many lines of print do each of the following produce? Assume all variables have been declared and are of type int.

   **A)**
   ```csharp
   i = 0;
   while (i < 100)
   {
       j = 0;
       while (j < 10)
       {
           Console.WriteLine("Hello");
           j++;
       }
       i += 2;
   }
   ```
   **Lines of Print**

   **B)**
   ```csharp
   i = 9;
   while(i >= 0)
   {
       Console.WriteLine("Hello");
       j = -3;
       while(j < 3)
       {
           Console.WriteLine("Mom");
           j++;
       }
       i--;
   }
   ```
   **Lines of Print**

4. Show what is printed as a result of each of the following: (all variables have been declared to be of type int.

   **A)**
   ```csharp
   a = 7;
   b = 3;
   Console.WriteLine(a/b);
   ```
   **Printed Result**

   **B)**
   ```csharp
   a = 12;
   b = 3;
   c = a/b*2;
   ```
   **Printed Result**

5. Explain the difference between a `console application` and a `windows application`. 
Typical part 2 questions
6. Answer the questions below about this method:

```csharp
private void MyMethod()
{
    string outNum = "";
    int i, j, n, fact;
    n = Convert.ToInt32(Console.ReadLine());
    i = 1;
    while (i <= n)
    {
        fact = 1;
        j = i;
        while (j > 1)
        {
            fact *= j;
            j--;
        }
        i++;
        outNum = Convert.ToString(fact);
        Console.WriteLine(outNum);
    }
}
```

Answer the following questions about this program:
A) If the input is 10 how many lines will the program produce in the output window when the program runs?.
B) What does the line `fact *= j;` do?
C) Why is the variable `fact` initialized to 1 instead of 0?

Typical part 3 questions
8. Write a program to evaluate the equation $y = x^3 - 4x^2 + 3x + 1$ for successive values of $x$ beginning at 0 and ending when $y$ is greater than 1000. Use step of 0.1 for the $x$ increment. Print all values of $y$.

9. Write a program to input a single digit from the keyboard. Print that number plus all of the other digits up to the number 100. Print each number on a new line. For example, your program's output might look like the following:
```
Enter an integer... 96
96
97
98
99
100
Push any key to continue...
```

10. Write a C# console program implementation to input a sequence of positive integers from the keyboard and print their average. The number of integers to be entered is unknown but the last integer will be a 0. Your program should prompt the user to enter an integer. If the integer is nonzero it should be part of the average but nothing should be printed except a prompt for another integer. This procedure should continue until the user enters a zero at which time your program should print the average of the numbers with the appropriate message.