Contents

Warm-up Exercises

1. Explain the concept of loops with sentinel, and give a small example.

2. Write a program containing a **while** loop that would display the numbers between -100 and 100 (both included) with a space between them when executed.

3. Write a **for** loop that displays on the screen the sequence "1, 2, 3, 4, 5, 6, 7, 8, 9, 10,".

4. Write a **for** loop that displays on the screen the sequence "1, 2, 3, 4, 5, 6, 7, 8, 9, 10". Notice that the final number is not followed by a comma.

5. Write a **for** loop that displays on the screen the sequence "1 3 5 7 9".

Questions

1. A while statement can cause logic errors where the body never stops executing. This is known as a(n)

☐ Syntax error
☐ Fatal error
☐ Infinite loop
☐ None of the above.

1. A _____ can be used in a repetition structure (a loop) to control the number of times a set of statements will execute.

☐ Declaration
☐ Counter
☐ Controller
☐ None of the above.

1. How many times is the body of the loop below executed?

```
int counter = 10;
while (counter >= 0)
{
```

```
    counter--;
}//End while
```

- ☐ 9
- ☐ 10
- ☐ 11
- ☐ 0

1. How many times is the while statement checked in the code below?

```
int counter = 10;
while (counter >= 0)
{
    counter--;
}//End while
```

- ☐ 9
- ☐ 12
- ☐ 11
- ☐ 0

1. Which of the following increments the variable a by one?

- ☐ ++a
- ☐ a++
- ☐ a+=1
- ☐ All of the above.

1. Counting loops should be controlled with _____ values.

- ☐ double
- ☐ int
- ☐ char
- ☐ None of the above.

1. A common logic error known as a(n) _____ occurs when the programmer incorrectly specifies a conditional operator, such as < instead of <=.

- ☐ Fatal error
- ☐ Off-by-one error
- ☐ Syntax error
- ☐ None of the above.

1. The header **for**(int i = 0; i <= 10; ++i) will cause i to be incremented:

- ☐ Before the body begins execution
- ☐ After the body begins to execute, but before it finishes
- ☐ After the entire body executes
- ☐ None of the above.

1. The _____ statement, when executed in a while loop, will skip the remaining statements in the loop body and proceed with the next iteration of the loop.

☐ continue
☐ break
☐ next
☐ None of the above.

1. Consider the code segment below.

```
if (gender == 1)
{
    if (age >= 65)
    {
        ++seniorFemales;
    }
}
```

This segment is equivalent to which of the following? - ( ) if (gender == 1 || age >= 65) { ++seniorFemales; } - ( ) if (gender == 1 && age >= 65) { ++seniorFemales; } - ( ) if (gender == 1 AND age >= 65) { ++seniorFemales; } - ( ) if (gender == 1 OR age >= 65) { ++seniorFemales; }

1. Methods that call themselves are known as _____ methods.

☐ Reiterative
☐ Self-calling
☐ Repeat-calling
☐ Recursive

1. What will be displayed on the screen by the following program?

```
for (int num = 3; num <= 5 ; num++)
    Console.Write(num + " ");
```

1. Given an **int** variable counter, write three statements to decrement its value by 1.

2. What will be displayed on the screen?

```
int x = 3, y = 7;
Console.WriteLine(x++ +" and "+ --y);
```

1. What will be displayed on the screen by the following program?

```
int counter = 2;
while (counter != 5)
{
    Console.Write(counter + "\n");
    counter++;
}
```

1. What will be displayed on the screen by the following program?

```
int counter = 10;
while (counter != 5);
Console.Write(counter + "\n");
counter--;
```

1. What will be displayed on the screen by the following program?

```
int counter = 7;
while (counter != 2);
Console.Write(counter + "\n");
counter--;
```

1. What do we name a variable that is incremented at every iteration of a loop, i.e., that keeps the running total?

Problems

1. Write an equivalent code replacing the while loop with a for loop, and provide short justification.

```
int A = 1;
while (A != 5)
{
    Console.WriteLine($"A= {A}");
    A = (A + 3) % 7;
}
Console.WriteLine($"A= {A}");
```

1. Find all syntax errors in this code

```
using System;
namespace ConsoleApp
{
    class Program
    {
        static void Main(string[] args)
        {
            Console.Write("n= );
            int n= Int32.Parse(Console.ReadLine());
            Console.Write($"The value of odd factorial of
  ↪  n is equal to {OddFactorial(n)}");
        }
        static int OddFactorial(int n);
        {
            fi ((n % 2) == 0)
                return -1;
            else if (n == 1) return 1;
```

```
            else return (n * OddFactorial(n - 2);
        }
    }
}
```

1. Write a C# program that takes a single-digit number as input and then, using a *for loop*, displays a rectangle of that digit that is 3 columns wide and 5 rows tall.

2. Assume you are given an initialized **string** variable `name`, and a **string** variable `field`. Write a small program that assigns to `field`

   - "CS" if name is "Turing" or "Liskov"
   - "Math" if name is "Aryabhata" or "Noether"
   - "Unknown" otherwise.

3. Assume you are given an un-assigned **string** variable `letterGrade`, and an already assigned **float** variable `numberGrade`. Write a small program that assigns "A" to `letterGrade` if `numberGrade` is between 100 and 90 (both included), "B" if `numberGrade` is between 90 (excluded) and 80 (included), etc., and "Invalid data" is strictly lower than 0 or strictly greater than 100. Should you use a **switch** statement or an **if…else if…else**?

4. Write a loop that displays on the screen numbers between (0.0, 1.0), using one decimal place precision, i.e. 0.0, 0.1, 0.2, 0.3…

5. Write a loop that displays on the screen a value that decreases by 0.5 on each iteration. Start from 10 and iterate as long as the value remains positive.

6. Write a program that computes the sum of numbers (1, n). You can choose any value you want for n, where n > 1. For example, if you choose n = 10, then program should compute and display the result for the following: 1 + 2 + 3 + 4 + 5 + 6 + 7 + 8 + 9 + 10 = 55.