

Please make sure to write your name and the date in the top left corner. You may use any course materials to answer the following questions and you may collaborate with others, but the work shown must be your own.

## 1 Spot The Error

**Problem 1.1.** The program below intends to print average of the scores. Identify the error(s) in the code below, and write the correct line(s).

```
#include <iostream>
#include <string>
using namespace std;
int main()
{
    int size = 5;
    double scores[size] = {85.4, 90.3, 100, 89, 74.5, 95.0};
    double sum = 0;
    for(int i = 0; i < size; i++)
    {
        sum += scores[i];
    }
    int avg = sum / 5.0;
    cout << "Average = " << avg << endl;
    return 0;
}
```

We can't give this length since that is indirectly added in the number of arguments given

We give one value too many. Only 5 is accepted

**Problem 1.2.** The program below displays transpose of a given matrix. The transpose of a matrix is simply a flipped version of the original matrix by switching its rows with its columns. Identify the error(s) in the code below, and write the correct line(s).

```
#include <iostream>
using namespace std;

// Function to calculate the transpose of a matrix
void transposeMatrix(int matrix[][3], int n, int m)
{
    for (int i = 0; i < n; i++)
    {
        for (int j = i + 1; j < m; j++)
        {
            temp = matrix[i][j];
            matrix[i][j] = matrix[j][i];
            matrix[j][i] = temp;
        }
    }
    return matrix;
}

int main()
{
    const int rows = 3;
    const int cols = 3;
    int originalMatrix[rows][cols] =
    {
        {1, 1, 1},
        {2, 2, 2},
        {3, 3, 3}
    };
}
```

No type declared

Can't return something from a void function

Name:

Date:

# CSCI 1300: Recitation 7

Spring 2024  
Version: Combined

Not how you  
update an array.  
Your expecting a  
return from a void  
function.

```
// Calculate the transpose matrix using the function
int result[rows][cols] = transposeMatrix(int originalMatrix[3][3], rows, cols);

// Display the transpose matrix
cout << "Transpose Matrix:" << endl;
for (int i = 0; i < rows; i++)
{
    for (int j = 0; j < cols; j++)
    {
        cout << result[i][j] << " ";
    }
    cout << endl;
}

return 0;
}
```

**Problem 1.3.** The program below tries to print all the items specified in the item array. Identify the error(s) in the code below, and write the correct line(s).

```
#include <iostream>
using namespace std;

int main()
{
    int N;
    string item[] = {"book", "pen", "pencil", "eraser"};

    //printing all the items
    for (int i = 0; i < N i++)
    {
        cout << "The item list has " << items[j] << endl;
    }
    return 0;
}
```

Never initialized N

Add semicolon  
after condition

i

**Problem 1.4.** The program below prints the strings that have length equal to 4. Identify the error(s) in the code below, and write the correct line(s).

```
#include <iostream>
#include <string>
using namespace std;

int main()
{
    const int N = 6;
    string animals[N] = {"lion", "cat", "bear", "dog", "elephant", "fox"};
    for (int i = 0; i < N; i++)
    {
        if (animals.length() == 4)
        {
            cout << animals[i] << endl;
        }
    }
    return 0;
}
```

Add index to array. if (animals[i].length() == 4)

Name:

Date:

# CSCI 1300: Recitation 7

Spring 2024  
Version: Combined

## 2 The Great ASCII-Art Decryptathon

In recitation this week, we will be doing something different. You will be participating in an ASCII Art Decryption Hackathon!!

Your team has stumbled upon a secret folder, filled with mysterious encrypted ascii art images. Your brilliant team leader has cracked the encryption and has devised the decryption strategies, but there's a twist: they setup the initial code but to unveil the content needs some help to complete the full decrypted masterpiece. To expedite the process, a decryption hackathon is set in motion.

In this hackathon, you are expected to work individually as well as a group to decrypt the hidden ASCII art using a series of functions. Your task is to complete the code started by your lead by implementing four fundamental decryption functions: `ToggleCaseAndShift`, `shiftCharBackward`, `ToggleCaseAndShiftRow` and `horizontalSwap`. Each of these functions decrypts distinct portions of the image, ultimately restoring the original ASCII art.

You can get the code file with the encrypted ASCII art from Github.

### 2.1 Step 1: Independent Function Writing

For this part of the Decryptathon you must work on your own and not share your code with others. **If you missed recitation, you must write all 3 functions for this step.** You must make sure your function works as expected before moving on to the next step. Version A must write the `ToggleCaseAndShift` function:

<b>Function:</b> <code>ToggleCaseAndShift(char[], int, int, int, int)</code>	<pre>void ToggleCaseAndShift(char asciiArt[84][141], int ↪ rowTop, int rowBottom, int colLeft, int colRight);</pre>
<b>Purpose:</b>	Converts every alphabet to upper case and then shifts all characters backward by 1
<b>Parameters:</b>	<b>asciiArt</b> - 2D character array of encrypted ASCII art <b>rowTop</b> - The index of the row where decryption begins <b>rowBottom</b> - The index of the row where decryption ends <b>colLeft</b> - The index of the column where decryption begins <b>colRight</b> - The index of the column where decryption ends
<b>Example:</b>	<p>Sample Input</p> <pre>bb ( (c dddee fffgg hhhii</pre> <p>Sample Output</p> <pre>AA''B CCDD EEFF GGHH</pre>

Name:

Date:

# CSCI 1300: Recitation 7

Spring 2024  
Version: Combined

Version B must write the `shiftCharBackward` function:

<b>Function:</b> <code>shiftCharBackward(char[], int, int, int, int)</code>	<pre>void shiftCharBackward(char asciiArt[84][141], int rowTop, ↳ int rowBottom, int colLeft, int colRight);</pre>
<b>Purpose:</b>	Shifts each character backward by 5 if row and column number are even, else shifts the character by 3
<b>Parameters:</b>	<b>asciiArt</b> - 2D character array of encrypted ASCII art <b>rowTop</b> - The index of the row where decryption begins <b>rowBottom</b> - The index of the row where decryption ends <b>colLeft</b> - The index of the column where decryption begins <b>colRight</b> - The index of the column where decryption ends
<b>Example:</b>	<p>Sample Input</p> <pre>FDFEG FFFGG JHJIK JJJKK</pre> <p>Sample Output</p> <pre>AAABB CCCDD EEEEFF GGGHH</pre>

Name:

Date:

# CSCI 1300: Recitation 7

Spring 2024  
Version: Combined

Version C must write the ToggleCaseAndShiftRow function:

<b>Function:</b> ToggleCaseAndShiftRow(char[], int, int, int, int)	<b>void ToggleCaseAndShiftRow(char</b> asciiArt[84][141], <b>int</b> ↪ rowTop, <b>int</b> rowBottom, <b>int</b> colLeft, <b>int</b> colRight);
<b>Purpose:</b>	Converts every alphabet to upper case and then shifts all characters forward by 1, if the row number is a mutiple of 3
<b>Parameters:</b>	<b>asciiArt</b> - 2D character array of encrypted ASCII art <b>rowTop</b> - The index of the row where decryption begins <b>rowBottom</b> - The index of the row where decryption ends <b>coLeft</b> - The index of the column where decryption begins <b>colRight</b> - The index of the column where decryption ends
<b>Example:</b>	Sample Input  aaabb CCCDD EEEEFF gg&&h  Sample Output  BBBCC CCCDD EEEEFF HH' 'I

Name:

Date:

# CSCI 1300: Recitation 7

Spring 2024  
Version: Combined

## 2.2 Step 2: Team Formation

**If you missed recitation, skip this step.** After successfully completing your individual function, it's time to form your team! Roam around the class to find two other students who have worked on the other decryption functions. You need to identify students who have completed Step 1 of all versions.

Once you have formed a group of 3, share the functions you have written. You should combine your code into a single document along with the code provided by your team lead. **Make sure you add a comment at the top of each function with the name of the person who wrote that particular function.**

Talk through your code with your teammates so you all know what all three functions do.

## 2.3 Step 3: Group Function Writing

**If you missed recitation, you must do this step on your own.** Now, as a team of three, your collective mission is to tackle the fourth and most challenging decryption function: `horizontalSwap`. This function is the key to decrypting the remaining part of the ASCII art. Engage in discussions, help each other and pool your coding skills to crack all the four encryption functions.

<b>Function:</b> <code>horizontalSwap(char[], int, int, int)</code>	<pre>void horizontalSwap(char asciiArt[84][141], int rowTop, → int rowBottom, int colLeft, int colRight);</pre>
<b>Purpose:</b>	Horizontally inverts each row (i.e. the first and last characters will be swapped; the second and second to last characters will be swapped; etc.)
<b>Parameters:</b>	<b>asciiArt</b> - 2D character array of encrypted ASCII art <b>rowTop</b> - The index of the row where decryption begins <b>rowBottom</b> - The index of the row where decryption ends <b>colLeft</b> - The index of the column where decryption begins <b>colRight</b> - The index of the column where decryption ends
<b>Example:</b>	<p>Sample Input</p> <pre>BBAAA DDCCC FFEEE HHGGG</pre> <p>Sample Output</p> <pre>AAABB CCDD EEEFF GGHH</pre>

Name:

Date:

# CSCI 1300: Recitation 7

Spring 2024  
Version: Combined

## 2.4 Step 4: Putting It All Together

Once your team has successfully written and tested all four functions, it's time to put the pieces together. Combine the four decryption functions and complete the code decrypt the entire ASCII art. The team that accomplishes this first will be crowned the Decryptathon champions!

After decrypting the ASCII art, answer each of the questions below:

**Problem 2.1.** Describe the decrypted ASCII art. What is the hidden message that you decrypted?

It is a code meme stating "When you ask VSCode why your code isn't working" along with two pictures of humans. One before and one after the text.

**Problem 2.2.** Now that you have seen both the encrypted and decrypted images, look more closely at the decryptAsciiArt function provided to you by your team lead. Identify the area of the ASCII art decrypted by each function – what are they? Write down the four coordinates specifying the rectangular boundaries of the decrypted area for each of the four decryption functions.

ToggleCaseAndShift encrypts from (28,47) to (84,94)  
shiftCharBackward encrypts from (0,0) to (28,141)  
ToggleCaseAndShiftRow encrypts from (28,94) to (84,141)  
horizontalSwap encrypts from (28,0) to (84,47)

**Problem 2.3.** How do you feel about using code that has been previously written by someone else and participating in live collaborative coding sessions with others? Did this activity affect your answer?

It was very fun.  
No not personally  
  
We should do more Hackathons!

**Submission Instructions:** Create a zip file that contains your final .cpp file (making sure to credit your teammates in your comments) as well as photos of this handout and submit it on Canvas.