

CSCE 20004 – Programming Foundations I

Programming Project Report

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Academic Integrity Statement: I pledge that I have neither given nor received unauthorized help on this programming assignment.

Problem Statement:

- Describe the goals of the programming assignment.
 - To create a C++ program that generates ASCII art patterns based on user input.
- What are the program inputs?
 - An integer value (size) entered by the user, constrained between 5 and 20.
- What are the program outputs?
 - ASCII representations of different patterns based on the user-provided size.
- What error handling was required?
 - The program validates the user input, ensuring that the size is between 5 and 20. If the input is outside this range, it displays an error message and prompts the user again.

Design:

- Describe the design decisions you made.
 - I made it where I commented what everything was doing so I could keep track of it
- What data structures did you use?
 - Basic integer variables to store user input and loop counters.
- What algorithms did you use?
 - Nested loops for pattern generation (outer loop for rows, inner loop for columns).
 - Conditional statements (if-else) to determine when to print a * or a space.
- What were pros/cons of choices above?
 - Pros: Simple structure, efficient looping, easy to understand and modify.
 - Cons: Limited scalability (fixed-size character spacing), relies on basic cout formatting.

Implementation:

- Describe your implementation process.
 - The project started with a basic framework for input validation.
 - Individual functions for each pattern were implemented and tested separately.
 - The final version was refined to include all patterns and ensure clean formatting.
- What sample code did you start with?

- Input 4 and draw 3
- How did you extend or adapt this code?
 - I just used it for my error check and the ASCII art
- What was your development timeline?
 - First I started by trying to print one of the ASCII art, and then I did the size, and after that I implemented the validity check, then I just did the rest of the art
- Document your AI prompts and AI answers.

generate C++ code for printing patterns for the letters A and R

Certainly! Below is a C++ program that prints the letters 'A' and 'R' using asterisks (*). The program defines functions to print each letter and then calls these functions in the `main` function.

cpp

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```

○ #include <iostream>
○ using namespace std;
○
○ // Function to print the letter 'A'
○ void printA() {
○     int rows = 7;
○     int cols = 5;
○
○     for (int row = 0; row < rows; ++row) {
○         for (int col = 0; col < cols; ++col) {
○             if (row == 0 && (col > 0 && col < cols - 1)) {
○                 cout << " * ";
○             } else if (row == 0 || row == rows - 1) {
○                 cout << " * ";
○             } else if (row == rows / 2) {
○                 cout << " * ";
○             } else {
○                 cout << " ";
○             }
○         }
○         cout << endl;
○     }
○ }
○
○ // Function to print the letter 'R'
○ void printR() {
○     int rows = 7;
○     int cols = 5;
○
○     for (int row = 0; row < rows; ++row) {
○         for (int col = 0; col < cols; ++col) {
○             if (row == 0 || (row == 0 && col < cols - 1) || (row == rows / 2 && col < cols - 1)) {

```

```

    << "x";
    } else if ( == - 1 && > 0 && < / 2) {
        << "x";
    } else if ( - == / 2) {
        << "x";
    } else {
        << " ";
    }
}
<< ;
}
}

int main() {
    << "Letter A:" << ;
    printA();
    << ;

    << "Letter R:" << ;
    printR();
    << ;

    return 0;
}

```

Explanation:

- Letter 'A':
 - The letter 'A' is printed with a height of 7 rows and a width of 5 columns.
 - The top row (except the first and last columns) is filled with *.
 - The first and last columns are filled with *.
 - The middle row (row 3) is filled with * to create the horizontal bar of the 'A'.
- Letter 'R':
 - The letter 'R' is also printed with a height of 7 rows and a width of 5 columns.
 - The first column is filled with *.
 - The top row (except the last column) is filled with *.
 - The middle row (row 3) is filled with * to create the horizontal bar of the 'R'.
 - The diagonal line from the middle to the bottom right is filled with *.

Output:

When you run the program, it will output the following:

Copy

-
-
-

* *

replace "height" and "width" with size

cpp

```

#include <iostream>
using namespace std;

// Function to print the letter 'A'
void printA(int n) {
    for (int i = 0; i < n; ++i) {
        for (int j = 0; j < n - i; ++j) {
            if (i == 0 && (j > 0 && j < n - 1)) {
                cout << "X";
            } else if (i == 0 || i == n - 1) {
                cout << "X";
            } else if (i == n / 2) {
                cout << "X";
            } else {
                cout << " ";
            }
        }
        cout << "\n";
    }
}

// Function to print the letter 'R'
void printR(int n) {

```

```

○   for (int i = 0; i < size; ++i) {
○       for (int j = 0; j < size; ++j) {
○           if (i == 0 || (i == 0 && j < size - 1) || (i == size / 2 && j < size - 1)) {
○               << "x";
○           } else if (i == size - 1 && j > 0 && j < size / 2) {
○               << "x";
○           } else if (i - size == size / 2) {
○               << "x";
○           } else {
○               << " ";
○           }
○       }
○       << "\n";
○   }
○ }

○   int main() {
○       int size = 7; // You can change this value to adjust the size of the letters
○
○       << "Letter A:" << "\n";
○       printA(size);
○       << "\n";
○
○       << "Letter R:" << "\n";
○       printR(size);
○       << "\n";
○
○       return 0;
○   }

```

Explanation:

- The **size** variable now determines both the height and width of the letters.
- The **size** is passed as an argument to the **printA** and **printR** functions.
- The logic for printing the letters remains the same, but the loops and conditions now use the **size** variable instead of separate **height** and **width** variables.

Output:

For **size = 7**, the output will be:

Copy

```

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○
○

```

-
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-
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-
-
-
-
-
-

* *

You can change the value of `size` in the `main` function to adjust the size of the letters. For example, setting `size = 5` will produce smaller letters, while `size = 9` will produce larger ones.

Let me know if you need further assistance! 😊

-

Testing:

- Describe how you tested your program.
 - I entered an input that was too big, too small, and a normal 1
- What were the normal inputs you used?
 - 5, 9, 20
- What were the special cases you tested?
 - 2, -2, 21
- Did everything work as expected?
 - Yes
- Include typescript showing program input/output.
 - Enter size (5-20): 5
 -
 - **Solid Square Pattern:**
 - * * * * *
 - * * * * *
 - * * * * *
 - * * * * *
 - * * * * *
 -
 - **Vertical Stripe Pattern:**
 - * * *
 - * * *
 - * * *
 - * * *
 - * * *
 -
 - **Letter F Pattern:**
 - * * * * *
 -

☐ * * * * *

☐ *

☐ *

☐ *

☐

☐ **Letter T Pattern:**

☐ * * * * *

☐ *

☐ *

☐ *

☐ *

☐

☐ **Letter Z Pattern:**

☐ * * * * *

☐ *

☐ *

☐ *

☐ * * * * *

☐

☐ **Letter A Pattern:**

☐ * * * * *

☐ * *

☐ * * * * *

☐ * *

☐ * *

☐

☐ **Letter R Pattern:**

☐ * * * * *

☐ * *

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☐ * *

☐ * *

☐

☐ **Enter size (5-20): 2**

☐ **Invalid size! Please enter a value between 5 and 20.**

☐ **Enter size (5-20): -2**

☐ **Invalid size! Please enter a value between 5 and 20.**

☐ **Enter size (5-20): 9**

☐

☐ **Solid Square Pattern:**

☐ * * * * * * * * *

☐ * * * * * * * * *

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☐ * * * * *

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☐ **Letter A Pattern:**

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☐ * *

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☐ * *

☐ * *

☐ * *

☐ * *

☐

☐ **Letter R Pattern:**

☐ * * * * *

☐ * *

☐ * *

☐ * *

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☐

☐ **Enter size (5-20): 21**

☐ **Invalid size! Please enter a value between 5 and 20.**

☐ **Enter size (5-20): 20.5**

☐

☐ **Solid Square Pattern:**

☐ * * * * *

☐ * * * * *

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☐ * * * * *

☐ * * * * *

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○ **Vertical Stripe Pattern:**

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○

○ **Letter F Pattern:**

○ * * * * *
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```

○ Letter A Pattern:
○ *****
○ *           *
○ *           *
○ *           *
○ *           *
○ *           *
○ *           *
○ *           *
○ *           *
○ *           *
○ *           *
○ *****
○ *           *
○ *           *
○ *           *
○ *           *
○ *           *
○ *           *
○ *           *
○ *           *
○ *           *
○
○ Letter R Pattern:
○ *****
○ *           *
○ *           *
○ *           *
○ *           *
○ *           *
○ *           *
○ *           *
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○ *           *
○ *           *
○ *****
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```

Conclusions:

- Describe the overall result of the assignment.
 - The program successfully implemented ASCII patterns with proper user input validation.
- Was the programming project a success?
 - Yes, the program met all requirements and displayed patterns accurately.
- What would you do same or differently next time?
 - I would probably just ask chatGPT to just implement the new art rather than just ask for some sample code
- How long did the project take to complete?
 - 3 hours