Fundamental of Programming
CSDC101

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Code

```
if (n % 2 == 0) { //if n is even it will output a square pattern
        cout << "number detected. Printing ______ pattern:\n";
            for (int i = 0; i < n; i++){ //outer loop for rows
                for (int j = 0; j < n; j++){ //inner loop for columns
                cout << "* ";
            }
            cout << endl; //New line after each row
        }
    }else{ //if n is odd it will output a right triangle pattern
        cout << "number detected. Printing ______ pattern:\n";
        for (int i = 1; i <= n; i++){ //outer loop for rows
            for (int j = 1; j <= i; j++){ //inner loop for columns
                cout << "* ";
            }
            cout << endl; //New line after each row
        }
```

Code Tracing 1

Variables

```
n = 3
i = 1
j = 1
if (n % 2 == 0) {
//n = 3 has a remainder, therefore n % 2 != 0 = false
        cout << "number detected. Printing ______ pattern:\n";
            for (int i = 0; i < j; i++){
                for (int j = 0; j < n; j++){
                cout << "* ";
            }
            cout << endl; //New line after each row
        }

    }else{
//moves to the next algortihm
        cout << "number detected. Printing ______ pattern:\n";
        for (int i = 1; i <= 3; i++){ //outer loop for rows
            for (int j = 1; j <= i; j++){ //inner loop for columns
                cout << "* ";
            }
            cout << endl; //New line after each row
```

```
Iteration 1
Variables
n = 3
i = 1
j = 1
cout << "number detected. Printing _____ pattern:\n";
        for (int i = 1; 1 <= 3; i++){ //outer loop for rows
            for (int j = 1; 1 <= 1; j++){ //inner loop for columns
                cout << "* ";
            }
            cout << endl;
        }
    }
Current Output:
*

Iteration 2
Variables
n = 3
i = 2
j = 2
cout << "number detected. Printing _____ pattern:\n";
        for (int i = 2; 2 <= 3; i++){ //outer loop for rows
            for (int j = 2; 2 <= 2; j++){ //inner loop for columns
                cout << "* ";
            }
            cout << endl;
        }
    }
Current Output:
*
* *
```

```
Iteration 3
Variables
n = 3
i = 3
j = 3
cout << "number detected. Printing _____ pattern:\n";
        for (int i = 3; 3 <= 3; i++){ //outer loop for rows
            for (int j = 3; 3 <= 3; j++){ //inner loop for columns
                cout << "* ";
            }
            cout << endl;
        }
    }
Current Output:
*
* *
* * *
Iteration 4
Variables
n = 3
i = 4
j = 4
cout << "number detected. Printing _____ pattern:\n";
//4 < = 3 = false, Program stops
        for (int i = 3; 4 <= 3; i++){ //outer loop for rows
            for (int j = 3; 4 <= 3; j++){ //inner loop for columns
                cout << "* ";
            }
            cout << endl;
        }
    }
Final Output:
*
* *
* * *
```

Code Tracing 2

Variables

n = 4

i = 0

j = 0

```
if (n % 2 == 0) {
//n = 4 does not have a remainder, therefore n % 2 == 0 = true
        cout << "number detected. Printing _____ pattern:\n";
            for (int i = 0; i < j; i++){ //outer loop for rows
                for (int j = 0; j < n; j++){ //inner loop for columns
                cout << "* ";
            }
            cout << endl; //New line after each
        }

    }else{
        cout << "number detected. Printing _____ pattern:\n";
        for (int i = 1; i <= 3; i++){ //outer loop for rows
            for (int j = 1; j <= i; j++){ //inner loop for columns
                cout << "* ";
            }
            cout << endl;
        }
    }
```

Iteration 1

Variables

n = 4

i = 0

j = 0

```
if (n % 2 == 0) {
        cout << "number detected. Printing _____ pattern:\n";
            for (int i = 0; 0 < 4; i++){ //outer loop for rows
                for (int j = 0; 0 < 4; j++){ //inner loop for columns
                cout << "* ";
            }
            cout << endl; //New line after each
        }
Current output:
* * * *
```

```
Iteration 2
Variables
n = 4
i = 1
j = 1
if (n % 2 == 0) {
        cout << "number detected. Printing _____ pattern:\n";
            for (int i = 1; 1 < 4; i++){ //outer loop for rows
                for (int j = 1; 1 < 4; j++){ //inner loop for columns
                cout << "* ";
            }
            cout << endl; //New line after each
        }
Current output:
* * * *
* * * *
Iteration 2
Variables
n = 4
i = 2
j = 2

if (n % 2 == 0) {
        cout << "number detected. Printing _____ pattern:\n";
            for (int i = 2; 2 < 4; i++){ //outer loop for rows
                for (int j = 2; 2 < 4; j++){ //inner loop for columns
                cout << "* ";
            }
            cout << endl; //New line after each
        }
Current output:
* * * *
* * * *
* * * *
```

```
Iteration 3
Variables
n = 4
i = 3
j = 3

if (n % 2 == 0) {
        cout << "number detected. Printing ______ pattern:\n";
            for (int i = 3; 3 < 4; i++){ //outer loop for rows
                for (int j = 3; 3 < 4; j++){ //inner loop for columns
                cout << "* ";
            }
            cout << endl; //New line after each
        }
Current output:
* * * *
* * * *
* * * *
* * * *
Iteration 4
Variables
n = 4
i = 4
j = 4

if (n % 2 == 0) {
        cout << "number detected. Printing ______ pattern:\n";
           //since i and j == 4, 4 < 4 = false, therefore program
stops
            for (int i = 4; 4 < 4; i++){ //outer loop for rows
                for (int j = 4; 4 < 4; j++){ //inner loop for columns
                cout << "* ";
            }
            cout << endl; //Program stops
        }
Final output:
* * * *
* * * *
* * * *
* * * *
```