

Nested Loops and Conditionals

Review

```
#include <stdio.h>
```

```
int main() {
```

```
    int countdown = 10;
```

```
    for (countdown = 10; countdown > 0; ++countdown) {
```

```
        printf("%i\n", countdown);
```

```
    }
```

```
    printf("Blastoff!\n");
```

```
    printf("The final value of countdown is %i\n", countdown);
```

```
    return 0;
```

```
}
```

What will be printed?

```
for (int i = 0; i < 10; i++) {  
    printf("%i\n", i + 1);  
}
```

Value of x after loop completes iterations

```
int x = 1;
while (x < 11) {
    x = x * 2;
}
printf("The value of x is : %i\n", x);
```

Nested Loops

- When a loop statement is contained within another loop statement, it's known as nested loop
- Nesting can continue to any desired level

Nested Loop Example

```
int main() {  
    for (int x = 0; x < 4; ++x) {  
        for (int y = 0; y < 4; ++y) {  
            printf("%i, %i\n", x, y);  
        }  
    }  
    return 0;  
}
```

- Outer Loop : x = 0
 - Inner Loop : y = 0
 - check inner loop condition
 - print the value of x & y (0, 0)
 - increment y
 - Inner Loop: y = 1
 - check inner loop condition
 - print the value of x & y (0, 1)
 - increment y
 - Inner Loop: y = 2
 - check inner loop condition
 - print the value of x & y (0, 2)
 - increment y
 - Inner Loop: y = 3
 - check inner loop condition
 - print the value of x & y (0, 2)
 - increment y
 - Inner Loop y = 4
 - check inner loop condition
 - breaks out of the inner loop
- Increment x

Nested Loop Example

```
int main(){  
    int square_size = 5;  
    for (int row = 0; row < square_size;  
        ++row) {  
        for (int column = 0; column <  
            square_size; ++column) {  
            printf("*");  
        }  
        printf("\n");  
    }  
}
```

	col = 0	col = 1	col = 2	col = 3	col = 4
row = 0	*	*	*	*	*

Nested Loop Example

```
int main(){  
    int square_size = 5;  
    for (int row = 0; row < square_size;  
        ++row) {  
        for (int column = 0; column <  
            square_size; ++column) {  
            printf("*");  
        }  
        printf("\n");  
    }  
}
```

	col = 0	col = 1	col = 2	col = 3	col = 4
row = 0	*	*	*	*	*
row = 1	*	*	*	*	*

Nested Loop Example

```
int main(){  
    int square_size = 5;  
    for (int row = 0; row < square_size;  
        ++row) {  
        for (int column = 0; column <  
            square_size; ++column) {  
            printf("*");  
        }  
        printf("\n");  
    }  
}
```

	col = 0	col = 1	col = 2	col = 3	col = 4
row = 0	*	*	*	*	*
row = 1	*	*	*	*	*
row = 2	*	*	*	*	*
row = 3	*	*	*	*	*
row = 4	*	*	*	*	*

Operators

- Relational operators:
 - `<`, `>`, `<=`, `>=`
- Equality operators:
 - `==`, `!=`
- Logical Operators:
 - `&&` - and
 - `||` - or
 - `!` – not
 - `!x` - This is 0 if x is nonzero and 1 if x is 0

Assignment : Pyramid



- Input size of the pyramid
- Calculate the number of **preceding** spaces
- Calculate the number of asterisks

Assignment : Checkerboard



- Similar to square problem
- Alternatingly print asterisks and spaces