## Day 13: Patterns - Part 1 (Stars & Numbers)

### 1. Print a right-angled triangle of stars.

#include <stdio.h>  
  
int main() {  
 int rows, i, j;  
  
 printf("Enter the number of rows: ");  
 scanf("%d", &rows);  
  
 for (i = 1; i <= rows; ++i) {  
 for (j = 1; j <= i; ++j) {  
 printf("\* ");  
 }  
 printf("\n");  
 }  
 return 0;  
}

### 2. Print an inverted triangle of stars.

#include <stdio.h>  
  
int main() {  
 int rows, i, j;  
  
 printf("Enter the number of rows: ");  
 scanf("%d", &rows);  
  
 for (i = rows; i >= 1; --i) {  
 for (j = 1; j <= i; ++j) {  
 printf("\* ");  
 }  
 printf("\n");  
 }  
 return 0;  
}

### 3. Print a pyramid of stars.

#include <stdio.h>  
  
int main() {  
 int rows, i, space, k = 0;  
  
 printf("Enter the number of rows: ");  
 scanf("%d", &rows);  
  
 for (i = 1; i <= rows; ++i, k = 0) {  
 for (space = 1; space <= rows - i; ++space) {  
 printf(" ");  
 }  
 while (k != 2 \* i - 1) {  
 printf("\* ");  
 ++k;  
 }  
 printf("\n");  
 }  
 return 0;  
}

### 4. Print a diamond pattern using stars.

#include <stdio.h>  
  
int main() {  
 int rows, i, space, k = 0;  
  
 printf("Enter the number of rows (for half of the diamond): ");  
 scanf("%d", &rows);  
  
 // Upper half of the diamond  
 for (i = 1; i <= rows; ++i, k = 0) {  
 for (space = 1; space <= rows - i; ++space) {  
 printf(" ");  
 }  
 while (k != 2 \* i - 1) {  
 printf("\* ");  
 ++k;  
 }  
 printf("\n");  
 }  
  
 // Lower half of the diamond  
 for (i = rows - 1; i >= 1; --i, k = 0) {  
 for (space = 1; space <= rows - i; ++space) {  
 printf(" ");  
 }  
 while (k != 2 \* i - 1) {  
 printf("\* ");  
 ++k;  
 }  
 printf("\n");  
 }  
 return 0;  
}

### 5. Print Floyd's triangle.

#include <stdio.h>  
  
int main() {  
 int rows, i, j, number = 1;  
  
 printf("Enter the number of rows: ");  
 scanf("%d", &rows);  
  
 for (i = 1; i <= rows; ++i) {  
 for (j = 1; j <= i; ++j) {  
 printf("%d ", number);  
 ++number;  
 }  
 printf("\n");  
 }  
 return 0;  
}

### 6. Print Pascal's triangle.

#include <stdio.h>  
  
long long factorial(int n) {  
 long long f = 1;  
 for (int i = 1; i <= n; i++) {  
 f \*= i;  
 }  
 return f;  
}  
  
int main() {  
 int rows, i, j;  
  
 printf("Enter the number of rows: ");  
 scanf("%d", &rows);  
  
 for (i = 0; i < rows; i++) {  
 for (j = 0; j <= rows - i - 2; j++) {  
 printf(" ");  
 }  
 for (j = 0; j <= i; j++) {  
 printf("%lld ", factorial(i) / (factorial(j) \* factorial(i - j)));  
 }  
 printf("\n");  
 }  
 return 0;  
}

### 7. Print a triangle of numbers (incremental).

#include <stdio.h>  
  
int main() {  
 int rows, i, j;  
  
 printf("Enter the number of rows: ");  
 scanf("%d", &rows);  
  
 for (i = 1; i <= rows; ++i) {  
 for (j = 1; j <= i; ++j) {  
 printf("%d ", j);  
 }  
 printf("\n");  
 }  
 return 0;  
}

### 8. Print a triangle of alphabets.

#include <stdio.h>  
  
int main() {  
 int rows, i, j;  
 char alphabet = 'A';  
  
 printf("Enter the number of rows: ");  
 scanf("%d", &rows);  
  
 for (i = 1; i <= rows; ++i) {  
 for (j = 1; j <= i; ++j) {  
 printf("%c ", alphabet);  
 ++alphabet;  
 }  
 printf("\n");  
 }  
 return 0;  
}

### 9. Print a hollow square pattern.

#include <stdio.h>  
  
int main() {  
 int size, i, j;  
  
 printf("Enter the size of the square: ");  
 scanf("%d", &size);  
  
 for (i = 1; i <= size; ++i) {  
 for (j = 1; j <= size; ++j) {  
 if (i == 1 || i == size || j == 1 || j == size) {  
 printf("\* ");  
 } else {  
 printf(" ");  
 }  
 }  
 printf("\n");  
 }  
 return 0;  
}

### 10. Print a checkerboard pattern of 1s and 0s.

#include <stdio.h>  
  
int main() {  
 int rows, cols, i, j;  
  
 printf("Enter the number of rows: ");  
 scanf("%d", &rows);  
 printf("Enter the number of columns: ");  
 scanf("%d", &cols);  
  
 for (i = 0; i < rows; ++i) {  
 for (j = 0; j < cols; ++j) {  
 if ((i + j) % 2 == 0) {  
 printf("1 ");  
 } else {  
 printf("0 ");  
 }  
 }  
 printf("\n");  
 }  
 return 0;  
}