Task 01

```
#include <stdio.h>

// Function prototypes
int calculateFactorial(int n);
int calculateCombination(int n, int r);
int calculatePermutation(int n, int r);

int main() {
   int choice;
   while (1) {
      printf("\n\nMenu:\n");
      printf("1. Calculate Factorial\n");
      printf("2. Calculate Combination (nCr)\n");
      printf("3. Calculate Permutation (nPr)\n");
      printf("4. Exit\n");
      printf("\nEnter your choice: ");
      scanf("%d", &choice);

      switch (choice) {
         case 1: {
            int n;
            while(1) {
               printf("Enter a non-negative integer: ");
               scanf("%d", &n);

               // Check if the input is negative
               if (n >= 0) {
                  printf("Factorial of %d is %d\n", n, calculateFactorial(n));
                  break;
               }
               else {
                  printf("Factorial of %d is undefined\n", n);
               }
            }
            break;
         }
         case 2: {
            int n, r;
```

```
            while (1) {
                printf("Enter values for n and r ( n >= r >= 0)\n");
                printf("n : ");
                scanf("%d", &n);
                printf("r : ");
                scanf("%d", &r);
                if (n >= r && r >= 0) {
                    printf("nCr is %d\n", calculateCombination(n, r));
                    break;
                }
                else {
                    printf("Invalid input. Please try again.\n");
                }
            }
            break;
        }
        case 3: {
            int n, r;
            while (1) {
                printf("Enter values for n and r ( n >= r >= 0)\n");
                printf("n : ");
                scanf("%d", &n);
                printf("r : ");
                scanf("%d", &r);
                if (n >= r && r >= 0) {
                    printf("nPr is %d\n", calculatePermutation(n, r));
                    break;
                } else {
                    printf("Invalid input. Please try again.\n");
                }
            }
            break;
        }
        case 4:
            printf("Exiting the program.\n");
            return 0;
        default:
            printf("Invalid choice. Please select a valid option.\n");
    }
}
```

```
    return 0;
}

// Function to calculate factorial
int calculateFactorial(int n) {
    int result = 1;
    for (int i = 1; i <= n; i++) {
        result *= i;
    }
    return result;
}

// Function to calculate combination (nCr)
int calculateCombination(int n, int r) {
    int numerator = calculateFactorial(n);
    int denominator = calculateFactorial(r) * calculateFactorial(n - r);
    return numerator / denominator;
}

// Function to calculate permutation (nPr)
int calculatePermutation(int n, int r) {
    int numerator = calculateFactorial(n);
    int denominator = calculateFactorial(n - r);
    return numerator / denominator;
}
```

Task 02

```
#include <stdio.h>

void drawTriangle(int height) {
    for (int x = 1; x <= height; x++) {
        for (int y = 1; y <= x; y++) {
            printf(" * ");
        }
        printf("\n");
    }
}

void drawRectangle(int width, int height) {
    for (int x = 1; x <= height; x++) {
        for (int y = 1; y <= width; y++) {
            printf(" * ");
        }
        printf("\n");
    }
}

int main(void) {
    int triangleHeight1, rectangleWidth1, rectangleHeight1,
triangleHeight2, rectangleWidth2, rectangleHeight2;

    printf("Enter the height of the triangle 1: ");
    scanf("%d", &triangleHeight1);

    printf("Enter the width of the rectangle 1: ");
    scanf("%d", &rectangleWidth1);

    printf("Enter the height of the rectangle 1: ");
    scanf("%d", &rectangleHeight1);

    printf("Enter the height of the triangle 2: ");
    scanf("%d", &triangleHeight2);

    printf("Enter the width of the rectangle 2: ");
    scanf("%d", &rectangleWidth2);

  i  printf("Enter the height of the rectangle 2: ");
    scanf("%d", &rectangleHeight2);



    printf("\n\nTriangle 1:\n");
    drawTriangle(triangleHeight1);
```

```
    printf("\nRectangle 1:\n");
    drawRectangle(rectangleWidth1, rectangleHeight1);

    printf("\n\n");

    printf("\nTriangle 2:\n");
    drawTriangle(triangleHeight2);

    printf("\nRectangle 2:\n");
    drawRectangle(rectangleWidth2, rectangleHeight2);

    return 0;
}
```

Pattern

```
#include <stdio.h>

void drawCircle();
void drawTriangle();
void drawRectangle();
void drawIntersect();
void drawBase();
void skip_5_lines();

int main(){

    //drawing the rocket ship
    drawTriangle();
    drawRectangle();
    drawIntersect();
    skip_5_lines();

    //drawing the female stick figure
    drawCircle();
    drawTriangle();
    drawIntersect();

    //drawing the male stick figure
    drawCircle();
    drawRectangle();
    drawIntersect();
    drawBase();
    skip_5_lines();

return 0;
```

```
}

void drawCircle(){
    printf("   *   \n");
    printf(" *   * \n");
    printf("  * *  \n");
}

void drawTriangle(){
    printf("   *   \n");
    printf("  * *  \n");
    printf(" * * * \n");
    printf("* * * *\n");
}

void drawRectangle(){
    printf("* * * * \n");
    printf("* * * * \n");
    printf("* * * * \n");
    printf("* * * * \n");
    printf("* * * * \n");
}

void drawIntersect(){
    printf("   /\\   \n");
    printf("  /  \\  \n");
    printf(" /    \\ \n");
}

void drawBase(){
    printf("---------\n");
}
```

Task 03

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

int main() {
    double a, b, c, angle;
    const double pi = 3.1415;

    // Input side lengths and angle in degrees
    printf("Enter the lengths of side b and c in same
units.\n");
    printf("b: ");
    scanf("%lf", &b);
    printf("c: ");
    scanf("%lf", &c);
    printf("Enter the angle in degrees: ");
    scanf("%lf", &angle);

    // Convert angle to radians
    double angleRadians = (angle * pi) / 180.0;

    // Calculate the length of side a using the formula
    a = sqrt(pow(b, 2) + pow(c, 2) - 2 * b * c *
cos(angleRadians));

    // Display the result
    printf("\nThe length of the third side (a) is %.2lf
units.\n", a);

    return 0;
}
~
```