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PROGRAMMING FUNDAMENTALS

LAB TASK#09

Q1.Creating a heart shape using nested loops in C involves carefully calculating the rows,

columns, and spaces to align stars (\*) into the desired pattern.

Here's a simple example:

```
main.c ×
         #include <stdio.h>
     2
         #include <stdlib.h>
     3
        ⊟int main() {
     4
             int n = 6; // Height of the heart
     5
     6
     7
             // Upper part of the heart
for (int i = n / 2; i <= n; i += 2) {</pre>
     8
                  / Print leading spaces
     9
                 10
                                   int main::n
    11
    12
    13
                 // Print the first half of the stars
                for (int j = 1; j <= i; j++) {
    printf("*");</pre>
    14
    15
    16
                 // Print the spaces between the two halves
    17
                 for (int j = 1; j <= n - i; j++) {
    printf(" ");</pre>
    18
    19
    20
                 // Print the second half of the stars
    21
main.c ×
     22
                      for (int j = 1; j <= i; j++) {
     23
                           printf("*");
     24
     25
                      printf("\n");
     26
     27
     28
                 // Lower part of the heart
     29
                 for (int i = n; i >= 1; i--) {
     30
                      // Print leading spaces
     31
                      for (int j = 0; j < n - i; j++) {
                           printf(" ");
     32
     33
     34
                      // Print the stars for the row
     35
                      for (int j = 1; j \leftarrow (2 * i) - 1; j++) {
                           printf("*");
     36
     37
                      printf("\n");
     38
     39
     40
                 return 0;
     41
      42
```

```
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Process returned 0 (0x0) execution time : 0.022 s

Press any key to continue.
```

## Q2.Diamond Pattern with Numbers

Write a program to generate a diamond pattern of numbers, where the user specifies

the number of rows for the top half. For example, if the user enters 4, the output

## should be:

```
main.c ×
         #include <stdio.h>
     1
     2
     3
        □int main() {
     4
             int rows;
     5
              // Ask the user for the number of rows for the top half
     6
     7
              printf("Enter the number of rows for the top half of the diamond:
     8
              scanf("%d", &rows);
     9
    10
              // Top half of the diamond
    11
              for (int i = 1; i <= rows; i++) {
    12
                  // Print spaces for alignment
    13
                  for (int j = 1; j <= rows - i; j++) {</pre>
                      printf(" ");
    14
    15
    16
                  // Print numbers in ascending order
    17
                  for (int j = 1; j <= i; j++) {
                     printf("%d", j);
    18
    19
    20
                  // Print numbers in descending order
    21
                  for (int j = i - 1; j >= 1; j--) {
```

```
main.c ×
    28
              for (int i = rows - 1; i >= 1; i--) {
    29
                 // Print spaces for alignment
    30
                  for (int j = 1; j <= rows - i; j++) {
                      printf(" ");
    31
    32
    33
                  // Print numbers in ascending order
                  for (int j = 1; j <= i; j++) {</pre>
    34
    35
                      printf("%d", j);
    36
                  // Print numbers in descending order
    37
    38
                  for (int j = i - 1; j >= 1; j--) {
                      printf("%d", j);
    39
    40
    41
                  printf("\n");
    42
    43
             return 0;
    44
    45
    46
    47
```

## **OUTPUT**

```
Enter the number of rows for the top half of the diamond: 4

1
121
12321
1234321
12321
121
1
Process returned 0 (0x0) execution time : 3.554 s
Press any key to continue.
```

## Q3. Right-Angled Triangle with Alphabet

Write a program to print a right-angled triangle where each row starts with the letter A and

continues alphabetically, wrapping around after Z. The user will input the number of rows.

For example, for 5 rows:

```
main.c ×
    1
         #include <stdio.h>
     2
     3
        □int main() {
     4
              int rows;
     5
              char letter = 'A'; // Start with 'A'
     6
     7
              // Get the number of rows from the user
     8
              printf("Enter the number of rows for the triangle: ");
              scanf("%d", &rows);
     9
    10
    11
              // Outer loop for rows
              for (int i = 1; i <= rows; i++) {
    12
    13
                  // Inner loop for printing letters
                  for (int j = 1; j <= i; j++) {
    printf("%c ", letter);
    letter++; // Move to the next letter</pre>
    14
    15
    16
    17
                      // Wrap around after 'Z'
    18
                      if (letter > 'Z') {
    letter = 'A';
    19
    20
    21
main.c ×
     11
                // Outer loop for rows
     12
                for (int i = 1; i <= rows; i++) {</pre>
     13
                     // Inner loop for printing letters
     14
                     for (int j = 1; j <= i; j++) {
                          printf("%c ", letter);
letter++; // Move to the next letter
     15
     16
     17
     18
                          // Wrap around after 'Z'
                          if (letter > 'Z') {
     19
                               letter = 'A';
     20
     21
     22
     23
                     printf("\n"); // Move to the next row
     24
     25
     26
                return 0;
     27
OUTPUT
Enter the number of rows for the triangle: 8
ВС
DEF
GHIJ
KLMNO
 QRSTU
VWXYZAB
 DEFGHIJ
Process returned 0 (0x0) \, execution time : 2.863 s
Press any key to continue.
```