Module 2.5: Patterns

```
Output

*

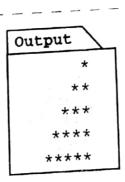
**

**

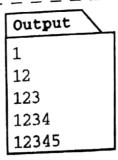
***

****
```

Dry 1	run n=5	
i	j	7
1	1	7
2	1,2	4
3	1,2,3	4
4	1,2,3,4	\dashv
5		
6	Loop terminates	



7		n=5	
Dry		1	
i	k	1	
1	1,2,3,4	1	
2	1,2,3	1,2	
3	1,2	1,2,3	
1	1	1,2,3,4	
5		1,2,3,4,5	
	Loop terminates		
(6) Loop terminates			



Dry	run n=5
1	j
1	1
2	1,2
3	1,2,3
4	1,2,3,4
5	1,2,3,4,5
6	Loop terminates

```
Output
      main()
                                                         1
       41
                                                        12
           int i, j, k, n=5;
           for(i=1; i<=n; ++i)
                                                      123
                                                     1234
               for(k=1; k<=n-i; ++k)
                                                     12345
                   printf(" ");
                                                                            n=5
                                                   Dry run
                                                             k
                                                    i
               for(j=1; j<=i; ++j)
                                                         1,2,3,4
                                                    1
                                                                    1,2
                                                         1,2,3
                                                    2
                                                                    1,2,3
                   printf("%d",j);
                                                         1,2
                                                                    1,2,3,4
                                                    4
                                                         1
                                                                    1,2,3,4,5
               printf("\n");
                                                          Loop terminates
                                                    <u>6</u>)
     #include <stdio.h>
                                                                               n=5
                                         Output
                                                           Dry
     main()
                                         $$$$$
                                                             1
                                                             5
                                                                  1,2,3,4,5
                                         $$$$
          int i, j, n=5;
                                                                   1,2,3,4
                                                             4
                                         $$$
          for(i=n; i>=1; --i)
                                                             3
                                                                   1,2,3
                                         $$
                                                             2
                                                                   1,2
                                         $
              for(j=1; j<=i; ++j)
                                                             1
                                                                  1
                                                                  Loop terminates
                   printf("$");
                   }
              printf("\n");
         }
    #include <stdio.h>
                                                    Output
    main()
                                                      $$$$$
       int i, j, k, n=5;
                                                       $$$$
         for(i=n; i>=1; --i)
                                                        $$$
                                                         $$
              for(k=1; k<=n-i; ++k)
                                                           $
                   printf(" ");
                                                   Dry run
                                                                              n=5
                                                    i
                                                             k
                                                                          į
              for(j=1; j<=i; ++j)
                                                                     1,2,3,4,5
                   (printf("$");)
                                                     4
                                                          1
                                                                     1,2,3,4
                                                          1,2
             printf("\n");
                                                                     1,2,3
                                                          1,2,3
                                                                     1,2,
                                                          1,2,3,4
                                                                     1,
        }
                                                          Loop terminates
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```

```
__ude <stdio.h>
main()
    int i, j, n=5;
    for(i=n; i>=1; --i)
        for(j=1; j<=i; ++j)
            printf("%d",j);
        printf("\n");
```

```
Output
12345
1234
123
12
1
```

321

21

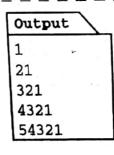
1

```
n=5
Dry run
       1,2,3,4,5
       1,2,3,4
       1,2,3
        1,2
  2
       Loop terminates
```

```
utput
#include <stdio.h>
                              o^{54321}
main()
                                4321
    int i,j,k,n=5;
    for(i=n; i>=1; --i)
         for (k=1; k \le n-1; ++k)
             {
             printf(" ");
         for(j=i; j>=1; --j)
             printf("%d",j);
          printf("\n");
```

```
n=5
Dry run
 i
          k
                  5,4,3,2,1
                  4,3,2,1
                  3,2,1
       1,2
 3
                   2,1
       1,2,3
       1,2,3,4
       Loop terminates
```

```
#include <stdio.h>
main()
     int i, j, n=5;
     for(i=1; i<=n; ++i)
          for(j=i; j>=1; --j)
               printf("%d",j);
           printf("\n");
       }
```



Dry	run n=5
i	j
1	1
2	2,1
3	3,2,1
.4	4,3,2,1
5	5,4,3,2,1
6 Loop terminates	
	•

```
nclude <stdio.h>
   main()
                                                Output
   #1 {
                                                    1
       int i, j, k, n=5;
                                                    12
       for(i=1; i<=n; ++i)
                                                   123
                                                 1234
            for (k=1; k <= n-i; ++k)
                                                 12345
                printf(" ");
                                                Dry run
                                                                       n=5
           for(j=1; j<=i; ++j)
                                                         k
                                                      1,2,3,4
                                                      1,2,3
                                                                1,2
               printf("%d",j);
                                                 3
                                                      1,2
                                                                1,2,3
                                                                1,2,3,4
          printf("\n");
                                                 5
                                                                1,2,3,4,5
                                                6)
                                                      Loop terminates
#include <stdio.h>
                                     Output
                                                        Dry run
                                                                          n=5
main()
                                     $$$$$
                                                         i
                                     $$$$
    int i, j, n=5;
                                                              1,2,3,4,5
                                                              1,2,3,4
    for(i=n; i>=1; --i)
                                     $$$
                                                         3
                                                               1,2,3
                                     $$
                                                         2
                                                               1,2
          for(j=1; j<=i; ++j)
                                                         1
                                                         (0)
                                                               Loop terminates
              printf("$");
         printf("\n");
#include <stdio.h>
                                                Output
main()
                                                  $$$$$
     int i, j, k, n=5;
                                                   $$$$
     for(i=n; i>=1; --i)
                                                    $$$
                                                      $$
           for (k=1; k <= n-i; ++k)
                                                                        n=5
                                                Dry run
               printf(" ");
                                                 1
                                                         k
                                                                1,2,3,4,5
           for(j=1; j<=i; ++j)
                                                      1
                                                                1,2,3,4
                {printf("$");}
                                                      1,2
                                                                1,2,3
           printf("\n");
                                                 2
                                                      1,2,3
                                                                1,2,
                                                      1,2,3,4
```

```
rude <stdio.h>
    main()
                                                                        n=5
                                     Output
                                                      Dry run
                                     12345
        int i, j, n=5;
                                                             1,2,3,4,5
                                     1234
        for(i=n; i>=1; --i)
                                                             1,2,3,4
                                     123
                                                             1,2,3
                                     12
            for(j=1; j<=i; ++j)
                                                             1,2
                                     1
                                                            Loop terminates
                                                       <u>ത</u>
                printf("%d",j);
           printf("\n");
                                   utput
                                                                         n=5
                                                Dry run
                                 o<sup>54321</sup>
 #include <stdio.h>
                                                          k
                                                  i
                                    4321
                                                                 5,4,3,2,1
main()
                                                                 4,3,2,1
                                                      1
                                     321
                                                                 3,2,1
     int i, j, k, n=5;
                                                      1,2
                                                  3
                                      21
                                                                 2,1
     for(i=n; i>=1; --i)
                                                      1,2,3
                                       1
                                                                 1
                                                      1,2,3,4
                                                  1
                                                       Loop terminates
          for (k=1; k <= n-i; ++k)
              printf(" ");
         for(j=i; j>=1; --j)
              printf("%d",j);
         printf("\n");
                                                                          n=5
                                                        Dry run
                                     Output
#include <stdio.h>
                                    1
main()
                                                              1
                                    21
                                                              2,1
     int i,j,n=5;
                                    321
                                                              3,2,1
     for(i=1; i<=n; ++i)
                                    4321
                                                              4,3,2,1
                                                              5,4,3,2,1
                                    54321
                                                              Loop terminates
          for(j=i; j>=1; --j)
               printf("%d",j);
```

printf("\n");

}

```
#include <stdio.h>
                                                          Output
     main()
                                                                 1
         int i, j, k, n=5;
                                                                21
         for(i=1; i<=n; ++i)
                                                               321
                                                              4321
              for (k=1; k \le n-i; ++k)
                                                             54321
                 printf(" ");
                                                  Dry run
                                                                         n=5
             for(j=i; j>=1; --j)
                                                        1,2,3,4
                 printf("%d",j);
                                                        1,2,3
                                                                  2,1
                                                        1,2
                                                                  3,2,1
           printf("\n");
                                                   4
                                                                  4,3,2,1
                                                                  5,4,3,2,1
                                                        Loop terminates
 #include <stdio.h>
                                    Output
                                                                         n=5
                                                      Dry run
 main()
                                    54321
                                    4321
                                                             5,4,3,2,1
     int i, j, n=5;
                                                             4,3,2,1
                                    321
     for(i=n; i>=1; --i)
                                                       3
                                                             3,2,1
                                   21
          {for(j=i; j>=1; --j)
                                                       2
                                                             2,1
                                   1
                                                       1
                                                       (0)
              printf("%d",j);
                                                             Loop terminates
         printf("\n");
     }
#include <stdio.h>
                                                           Output
main()
                                                            12345
                                                            1234
     int i, j, k, n=5;
                                                              123
   for(i=n; i>=1; --i)
                                                              12
          \{for(k=1; k<=n-i; ++k)\}
                                                                1
               {printf(" ");
                                                                        n=5
                                               Dry run
                                                         k
          for(j=1; j<=i; ++j)
                                                                1,2,3,4,5
                                                     1
                                                                1,2,3,4
               printf("%d",j);
                                                     1.2
                                                                1,2,3
                                                     1,2,3
                                                                1,2
          printf("\n");
                                                     1,2,3,4
```

Loop terminates

```
#include <stdio.h>
                                                     Dry run
  main()
                                   Output
                                   54321
                                                           5,4,3,2,1
      int i.j, n=5;
                                                      1
                                   5432
                                                           5,4,3,2
      for(i=1; i<=n; ++i)
                                   543
                                                           5,4,3
                                                      3
                                   54
                                                            5,4
                                                      4
          for(j=n; j>=i; --j)
                                                      6
                                                           Loop terminates
              printf("%d",j);
         printf("\n");
#include <stdio.h>
                                                        Output
main()
                                                         12345
                                                          2345
    int i, j, k, n=5;
                                                            345
    for(i=n; i>=1; --i)
                                                             45
                                                              5
         for(k=1; k<=n-i; ++k)
                                                                       n=5
                                              Dry run
              printf(" ");
                                               i
                                                               1,2,3,4,5
                                               5
                                                               2,3,4,5
                                                    1
         for(j=n-i+1; j<=n; ++j)
                                                               3,4,5
                                                    1,2
                                                               4,5
                                                    1,2,3
              printf("%d",j);
                                               1
                                                    1,2,3,4
                                                    Loop terminates
         printf("\n");
     }
                                                       Output
 #include <stdio.h>
                                                       5
main()
                                                       54
                                                       543
     int i, j, n=5;
                                                       5432
      for(i=1; i<=n; ++i)
                                                       54321
          for (j=n; j>=n-i+1; --j)
                                                                   n=5
                                                Dry run
               printf("%d",j);
                                                               j
           printf("\n");
                                                 2
                                                       5,4
                                                       5,4,3
```

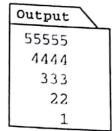
}

4

5,4,3,2

5,4,3,2,1

Loop terminates



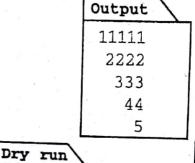
Dry	run		n=5
i	k	4	
5	-	1,2,3,4,	5
4	1	1,2,3,4	
3	1,2	1,2,3	
2	1,2,3	1,2	
1	1,2,3,4	1	
0	0 Loop terminates		

	Output	1
	55555	
	4444	
	333	
	22	
1	1	A-11
	14. T. A.	37

Dry	run n=5
i	j
5	1,2,3,4,5
4	2,3,4,5
3	3,4,5
2	4,5
1	5
0	Loop terminates

```
#include <stdio.h>
main()

{
   int i.j,k,n=5;
   for(i=1; i<=n; ++i)
   {
      for(k=1; k<i; ++k)
        {printf("");
      }
      for(j=1; j<=n-i+1; ++j)
      {
            printf("%d",i);
        }
      printf("\n");
      }
}</pre>
```



Dry	run		n=5
i	k	i	
1	-	1,2,3,4,5	
2	1	1,2,3,4	
3	1,2	1,2,3	
4	1,2,3	1,2	
5	1,2,3,4	1	
6	Loop terminates		

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```
#include <stdio.h>
                                                                    n=5
                                 Output
                                              Dry run
   main()
                                     1
       int i, j, k, n=5;
                                                    1,2,3,4
                                    2 2
       for(i=1; i<=n; ++i)
                                                    1,2,3
                                                2
                                   3 3 3
                                                              1,2,3
                                                    1,2
                                                3
                                  4 4 4 4
                                                              1,2,3,4
                                                4
           for(k=1;k<=n-i;++k)
                                 5 5 5 5 5
                                                              1,2,3,4,5
                                                    Loop terminates
               printf(" ");
          for(j=1; j<=i; ++j)
              printf("%d ",i); /* one (1) space after %d*/
         printf("\n");
                                                                        n=5
#include <stdio.h>
                                Output
                                               Dry run
                                                                    t
                                                         k
                                    5
main()
                                                     1,2,3,4
                                   4 4
                                                                5,4
                                                     1,2,3
    int i,j,k,n=5;
                                  3 3 3
                                                                5,4,3
                                                     1,2
                                                3
    for(i=n; i>=1; --i)
                                 2 2 2 2
                                                                5,4,3,2
                                                     2
                                                2
                                                                5,4,3,2,1
                                11111
                                                1
        for(k=1; k<i; ++k)
                                                      Loop terminates
                                                何
             printf(" ");
        for(j=n; j>=i; --j)
             printf("%d ",i); /* one (1) space after %d*/
        printf("\n");
    }
#include <stdio.h>
                                                                        n=5
                                Output
                                               Dry run
main()
                                                i
                                                        k
                                    a
                                                     1,2,3,4
                                                               5
                                   a b
    char ch='a'-1;
                                                     1,2,3
                                                                5,4
                                  abc.
    int i, j, k, n=5;
                                                3
                                                     1,2
                                                                5,4,3
                                 abcd
                                                2
                                                                5,4,3,2
    for(i=1; i<=n; ++i)
                                abcde
                                                1
                                                               5,4,3,2,1
                                               (O)
                                                     Loop terminates
         for (k=1; k<=n-i; ++k)
              printf(" ");
```

```
for(j=1; j<=i; ++j)
                printf("%c *,ch+j);/* one (1) space after %d*/
            printf("\n");
  #include <stdio.h>
                                Output
                                             Dry
                                                  run
                                                                    n=5
  main()
                                                   1,2,3,4
      int i,j,k,n=5;
                                                   1,2,3
                                                             1,2
      for(i=1; i<=n; ++i)
                                                   1,2
                                                             1,2,3
                                                             1,2,3,4
          for (k=1; k < = n-i; ++k)
                                                             1,2,3,4,5
                                              6)
                                                   Loop terminates
              printf(" ");
          for(j=1; j<=i; ++j)
              printf("*"); /* one (1) space after '*' */
         printf("\n");
#include <stdio.h>
                               Output
                                                                     n=5
                                              Dry run
main()
                                abcde
                                              ٠i
                                                       k
                                                                  j
                                                              1,2,3,4,5
                                 abcd
    char ch='a'-1;
                                               4
                                                    1
                                                              1,2,3,4
                                  abc
    int i, j, k, n=5;
                                                    1,2
                                                              1,2,3
                                    a b
                                                    1,2,3
                                                              1,2
    for(i=n; i>=1; --i)
                                     a
                                               1
                                                    1,2,3,4
                                                    Loop terminates
         for (k=1; k <= n-i; ++k)
              printf(" ");
         for(j=1; j<=i; ++j)
              printf("%c ",ch+j); /* one (1) space after %d*/
         printf("\n");
```

```
#include <stdio.h>
main()
                                Output
                                                                    n=5
                                             Dry run
    int i,j,k,n=5;
                                               5
                                                             1,2,3,4,5
    for(i=n; i>=1; --i)
                                                   1
                                                             1,2,3,4
                                               4
                                                   1,2
                                                             1,2,3
                                               3
        for (k=1; k <= n-i; ++k)
                                                    1,2,3
                                                              1,2
                                               1
                                                    1,2,3,4
                                                    Loop terminates
            printf(" ");
       for(j=1; j<=i; ++j)
            printf("*"); /* one (1) space after '*' */
      printf("\n");
```