Programming Practice: Multiplication Tables

1. Write a C program to print the multiplication table of decimal digits (1 to 9) in the following two formats. Solution: multiplication_table_decimal.c.

```
D:\>multiplication_table_decimal
Multiplication Table for Decimal Digits (1 to 9) Format 1:

     | 1   2   3   4   5   6   7   8   9
   --+-------------------------------------
   1 | 1   2   3   4   5   6   7   8   9
   2 | 2   4   6   8  10  12  14  16  18
   3 | 3   6   9  12  15  18  21  24  27
   4 | 4   8  12  16  20  24  28  32  36
   5 | 5  10  15  20  25  30  35  40  45
   6 | 6  12  18  24  30  36  42  48  54
   7 | 7  14  21  28  35  42  49  56  63
   8 | 8  16  24  32  40  48  56  64  72
   9 | 9  18  27  36  45  54  63  72  81

*********************************************************************

Multiplication Table for Decimal Digits (1 to 9) Format 2:

 1*1= 1  1*2= 2  1*3= 3  1*4= 4  1*5= 5  1*6= 6  1*7= 7  1*8= 8  1*9= 9
 2*1= 2  2*2= 4  2*3= 6  2*4= 8  2*5=10  2*6=12  2*7=14  2*8=16  2*9=18
 3*1= 3  3*2= 6  3*3= 9  3*4=12  3*5=15  3*6=18  3*7=21  3*8=24  3*9=27
 4*1= 4  4*2= 8  4*3=12  4*4=16  4*5=20  4*6=24  4*7=28  4*8=32  4*9=36
 5*1= 5  5*2=10  5*3=15  5*4=20  5*5=25  5*6=30  5*7=35  5*8=40  5*9=45
 6*1= 6  6*2=12  6*3=18  6*4=24  6*5=30  6*6=36  6*7=42  6*8=48  6*9=54
 7*1= 7  7*2=14  7*3=21  7*4=28  7*5=35  7*6=42  7*7=49  7*8=56  7*9=63
 8*1= 8  8*2=16  8*3=24  8*4=32  8*5=40  8*6=48  8*7=56  8*8=64  8*9=72
 9*1= 9  9*2=18  9*3=27  9*4=36  9*5=45  9*6=54  9*7=63  9*8=72  9*9=81
```

2. Write a C program to print the multiplication table of hexadecimal digits (1 to F) in the following two formats. Solutions: multiplication_table_hexadecimal.c.

```
):\>multiplication_table_hexadecimal
Multiplication Table for Hexadecimal Digits (1 to F) Format 1:

     | 1   2   3   4   5   6   7   8   9   A   B   C   D   E   F
   --+-----------------------------------------------------------
   1 | 1   2   3   4   5   6   7   8   9   A   B   C   D   E   F
   2 | 2   4   6   8   A   C   E  10  12  14  16  18  1A  1C  1E
   3 | 3   6   9   C   F  12  15  18  1B  1E  21  24  27  2A  2D
   4 | 4   8   C  10  14  18  1C  20  24  28  2C  30  34  38  3C
   5 | 5   A   F  14  19  1E  23  28  2D  32  37  3C  41  46  4B
   6 | 6   C  12  18  1E  24  2A  30  36  3C  42  48  4E  54  5A
   7 | 7   E  15  1C  23  2A  31  38  3F  46  4D  54  5B  62  69
   8 | 8  10  18  20  28  30  38  40  48  50  58  60  68  70  78
   9 | 9  12  1B  24  2D  36  3F  48  51  5A  63  6C  75  7E  87
   A | A  14  1E  28  32  3C  46  50  5A  64  6E  78  82  8C  96
   B | B  16  21  2C  37  42  4D  58  63  6E  79  84  8F  9A  A5
   C | C  18  24  30  3C  48  54  60  6C  78  84  90  9C  A8  B4
   D | D  1A  27  34  41  4E  5B  68  75  82  8F  9C  A9  B6  C3
   E | E  1C  2A  38  46  54  62  70  7E  8C  9A  A8  B6  C4  D2
   F | F  1E  2D  3C  4B  5A  69  78  87  96  A5  B4  C3  D2  E1
```

```
********************************************************************************

Multiplication Table for Hexadecimal Digits (1 to F) Format 2:

 1*1= 1  1*2= 2  1*3= 3  1*4= 4  1*5= 5  1*6= 6  1*7= 7  1*8= 8
 1*9= 9  1*A= A  1*B= B  1*C= C  1*D= D  1*E= E  1*F= F

 2*1= 2  2*2= 4  2*3= 6  2*4= 8  2*5= A  2*6= C  2*7= E  2*8=10
 2*9=12  2*A=14  2*B=16  2*C=18  2*D=1A  2*E=1C  2*F=1E

 3*1= 3  3*2= 6  3*3= 9  3*4= C  3*5= F  3*6=12  3*7=15  3*8=18
 3*9=1B  3*A=1E  3*B=21  3*C=24  3*D=27  3*E=2A  3*F=2D

 4*1= 4  4*2= 8  4*3= C  4*4=10  4*5=14  4*6=18  4*7=1C  4*8=20
 4*9=24  4*A=28  4*B=2C  4*C=30  4*D=34  4*E=38  4*F=3C

 5*1= 5  5*2= A  5*3= F  5*4=14  5*5=19  5*6=1E  5*7=23  5*8=28
 5*9=2D  5*A=32  5*B=37  5*C=3C  5*D=41  5*E=46  5*F=4B

 6*1= 6  6*2= C  6*3=12  6*4=18  6*5=1E  6*6=24  6*7=2A  6*8=30
 6*9=36  6*A=3C  6*B=42  6*C=48  6*D=4E  6*E=54  6*F=5A

 7*1= 7  7*2= E  7*3=15  7*4=1C  7*5=23  7*6=2A  7*7=31  7*8=38
 7*9=3F  7*A=46  7*B=4D  7*C=54  7*D=5B  7*E=62  7*F=69

 8*1= 8  8*2=10  8*3=18  8*4=20  8*5=28  8*6=30  8*7=38  8*8=40
 8*9=48  8*A=50  8*B=58  8*C=60  8*D=68  8*E=70  8*F=78

 9*1= 9  9*2=12  9*3=1B  9*4=24  9*5=2D  9*6=36  9*7=3F  9*8=48
 9*9=51  9*A=5A  9*B=63  9*C=6C  9*D=75  9*E=7E  9*F=87

 A*1= A  A*2=14  A*3=1E  A*4=28  A*5=32  A*6=3C  A*7=46  A*8=50
 A*9=5A  A*A=64  A*B=6E  A*C=78  A*D=82  A*E=8C  A*F=96

 B*1= B  B*2=16  B*3=21  B*4=2C  B*5=37  B*6=42  B*7=4D  B*8=58
 B*9=63  B*A=6E  B*B=79  B*C=84  B*D=8F  B*E=9A  B*F=A5

 C*1= C  C*2=18  C*3=24  C*4=30  C*5=3C  C*6=48  C*7=54  C*8=60
 C*9=6C  C*A=78  C*B=84  C*C=90  C*D=9C  C*E=A8  C*F=B4

 D*1= D  D*2=1A  D*3=27  D*4=34  D*5=41  D*6=4E  D*7=5B  D*8=68
 D*9=75  D*A=82  D*B=8F  D*C=9C  D*D=A9  D*E=B6  D*F=C3

 E*1= E  E*2=1C  E*3=2A  E*4=38  E*5=46  E*6=54  E*7=62  E*8=70
 E*9=7E  E*A=8C  E*B=9A  E*C=A8  E*D=B6  E*E=C4  E*F=D2

 F*1= F  F*2=1E  F*3=2D  F*4=3C  F*5=4B  F*6=5A  F*7=69  F*8=78
 F*9=87  F*A=96  F*B=A5  F*C=B4  F*D=C3  F*E=D2  F*F=E1
```

3. Write a C program to print the 15 by 15 hexadecimal multiplication table in vertical format as shown below. Solutions: multiplication_table_hexadecimal_vertical.c.

命令提示字元

```
D:\>mexam_3
Hexadecimal Multiplication Table in Vertical Format:

  1   1   1   1   1   1   1   1   1   1   1   1   1   1   1
x 1 x 2 x 3 x 4 x 5 x 6 x 7 x 8 x 9 x A x B x C x D x E x F
--- --- --- --- --- --- --- --- --- --- --- --- --- --- ---
  1   2   3   4   5   6   7   8   9   A   B   C   D   E   F

  2   2   2   2   2   2   2   2   2   2   2   2   2   2   2
x 1 x 2 x 3 x 4 x 5 x 6 x 7 x 8 x 9 x A x B x C x D x E x F
--- --- --- --- --- --- --- --- --- --- --- --- --- --- ---
  2   4   6   8   A   C   E  10  12  14  16  18  1A  1C  1E

  3   3   3   3   3   3   3   3   3   3   3   3   3   3   3
x 1 x 2 x 3 x 4 x 5 x 6 x 7 x 8 x 9 x A x B x C x D x E x F
--- --- --- --- --- --- --- --- --- --- --- --- --- --- ---
  3   6   9   C   F  12  15  18  1B  1E  21  24  27  2A  2D

  4   4   4   4   4   4   4   4   4   4   4   4   4   4   4
x 1 x 2 x 3 x 4 x 5 x 6 x 7 x 8 x 9 x A x B x C x D x E x F
--- --- --- --- --- --- --- --- --- --- --- --- --- --- ---
  4   8   C  10  14  18  1C  20  24  28  2C  30  34  38  3C

  5   5   5   5   5   5   5   5   5   5   5   5   5   5   5
x 1 x 2 x 3 x 4 x 5 x 6 x 7 x 8 x 9 x A x B x C x D x E x F
--- --- --- --- --- --- --- --- --- --- --- --- --- --- ---
  5   A   F  14  19  1E  23  28  2D  32  37  3C  41  46  4B

  6   6   6   6   6   6   6   6   6   6   6   6   6   6   6
x 1 x 2 x 3 x 4 x 5 x 6 x 7 x 8 x 9 x A x B x C x D x E x F
--- --- --- --- --- --- --- --- --- --- --- --- --- --- ---
  6   C  12  18  1E  24  2A  30  36  3C  42  48  4E  54  5A

  7   7   7   7   7   7   7   7   7   7   7   7   7   7   7
x 1 x 2 x 3 x 4 x 5 x 6 x 7 x 8 x 9 x A x B x C x D x E x F
--- --- --- --- --- --- --- --- --- --- --- --- --- --- ---
  7   E  15  1C  23  2A  31  38  3F  46  4D  54  5B  62  69

  8   8   8   8   8   8   8   8   8   8   8   8   8   8   8
x 1 x 2 x 3 x 4 x 5 x 6 x 7 x 8 x 9 x A x B x C x D x E x F
--- --- --- --- --- --- --- --- --- --- --- --- --- --- ---
  8  10  18  20  28  30  38  40  48  50  58  60  68  70  78

  9   9   9   9   9   9   9   9   9   9   9   9   9   9   9
x 1 x 2 x 3 x 4 x 5 x 6 x 7 x 8 x 9 x A x B x C x D x E x F
--- --- --- --- --- --- --- --- --- --- --- --- --- --- ---
  9  12  1B  24  2D  36  3F  48  51  5A  63  6C  75  7E  87

  A   A   A   A   A   A   A   A   A   A   A   A   A   A   A
x 1 x 2 x 3 x 4 x 5 x 6 x 7 x 8 x 9 x A x B x C x D x E x F
--- --- --- --- --- --- --- --- --- --- --- --- --- --- ---
  A  14  1E  28  32  3C  46  50  5A  64  6E  78  82  8C  96

  B   B   B   B   B   B   B   B   B   B   B   B   B   B   B
x 1 x 2 x 3 x 4 x 5 x 6 x 7 x 8 x 9 x A x B x C x D x E x F
--- --- --- --- --- --- --- --- --- --- --- --- --- --- ---
  B  16  21  2C  37  42  4D  58  63  6E  79  84  8F  9A  A5

  C   C   C   C   C   C   C   C   C   C   C   C   C   C   C
x 1 x 2 x 3 x 4 x 5 x 6 x 7 x 8 x 9 x A x B x C x D x E x F
--- --- --- --- --- --- --- --- --- --- --- --- --- --- ---
  C  18  24  30  3C  48  54  60  6C  78  84  90  9C  A8  B4

  D   D   D   D   D   D   D   D   D   D   D   D   D   D   D
x 1 x 2 x 3 x 4 x 5 x 6 x 7 x 8 x 9 x A x B x C x D x E x F
--- --- --- --- --- --- --- --- --- --- --- --- --- --- ---
  D  1A  27  34  41  4E  5B  68  75  82  8F  9C  A9  B6  C3

  E   E   E   E   E   E   E   E   E   E   E   E   E   E   E
x 1 x 2 x 3 x 4 x 5 x 6 x 7 x 8 x 9 x A x B x C x D x E x F
--- --- --- --- --- --- --- --- --- --- --- --- --- --- ---
  E  1C  2A  38  46  54  62  70  7E  8C  9A  A8  B6  C4  D2

  F   F   F   F   F   F   F   F   F   F   F   F   F   F   F
x 1 x 2 x 3 x 4 x 5 x 6 x 7 x 8 x 9 x A x B x C x D x E x F
--- --- --- --- --- --- --- --- --- --- --- --- --- --- ---
  F  1E  2D  3C  4B  5A  69  78  87  96  A5  B4  C3  D2  E1
```