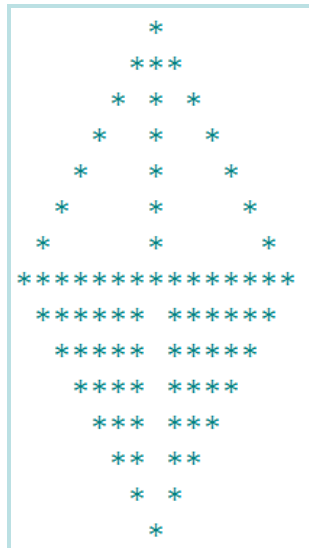


# Solutions for Exercises 04

1. Write 4 overloading static methods to construct a String that compose a diamond:

```
public static String diamond ();  
public static String diamond (int n);  
public static String diamond (int n, char flash);  
public static String diamond (int n, char flash, char blank);
```

`System.out.print( diamond() )` will output as left below:



`System.out.print( diamond( 5 ) )` will output as right above.

`System.out.print( diamond( 7, '$' ) )` will output as left below:

```

      $
     $$$
    $ $ $
   $ $ $
  $ $ $
 $ $ $
$ $ $ $ $ $ $ $ $ $ $ $
$ $ $ $ $ $ $ $ $ $
$ $ $ $ $ $ $
$ $ $ $ $ $
$ $ $ $
$ $ $
$ $
$

```

```

.....@
....@ @ @
...@ . @ . @
..@ . @ . @
.@ . . @ . . @
@@@@@@@@@@@@@@@@
. @ @ @ @ . @ @ @ @
.. @ @ @ . @ @ @
... @ @ . @ @
....@ . @
.....@

```

`System.out.print( diamond( 6, '@', '.' ) )` will output as right above.

```

1  /**
2      Diamond.java
3      @Max, 2017-03-27, 2018-04-02
4
5      ( n, flash, blank )
6  Diamond( 6,  '*',  '.' )
7
8      .....*          <== barln(n-1, 1) = barln(5,1)
9      .....***         ||
10     ...*.*.*          || i = 2..5    [2..n-1]
11     ..*..*..*         || bar(n-i,1) + bar(i-2,1) + barln(i-2,1)
12     .*...*...*        ||
13     *****          <== barln(0, 2*n-1) = barln(0,11)
14     .*****.*****   ||
15     ..***.***         || i = 5..2    [n-1..2] (down to)
16     ...**.*          || bar(n-i, i-1) + barln(1, i-1)
17     ....*.*          ||
18     .....*          <== barln(n-1, 1) = barln(5,1)
19
20  */
21

```

```
21
22 public class Diamond {
23     public static void main (String[] args) {
24         System.out.print( diamond() );
25         System.out.print( diamond( 5 ) );
26         System.out.print( diamond( 7, '$' ) );
27         System.out.print( diamond( 6, '@', '.' ) );
28     }
29
30     public static String diamond () {
31         return diamond( 8, '*', ' ' );
32     }
33     public static String diamond (int n) {
34         return diamond( n, '*', ' ' );
35     }
36     public static String diamond (int n, char flash) {
37         return diamond( n, flash, ' ' );
38     }
39
```

```
39
40 private static char flash, blank;
41 public static String diamond (int n, char flash, char blank) {
42     Diamond.flash = flash;
43     Diamond.blank = blank;
44     String image = barln( n-1, 1 );
45
46     for (int i = 2; i < n; i++) {
47         image += bar( n-i, 1);
48         image += bar( i-2, 1);
49         image += barln( i-2, 1);
50     }
51
52     image += barln( 0, 2*n - 1 );
53
54     for (int i = n-1; i > 1; i--) {
55         image += bar( n-i, i-1 );
56         image += barln( 1, i-1 );
57     }
58
59     image += barln( n-1, 1 );
60
61     return image;
62 }
```

```
63
64 private static String bar (int nBlank, int nFlash) {
65     return repeatChars( nBlank, blank ) + repeatChars( nFlash, flash );
66 }
67 private static String barln (int nBlank, int nFlash) {
68     return bar( nBlank, nFlash ) + '\n';
69 }
70 private static String repeatChars (int n, char c) {
71     String s = "";
72     while (n-- > 0) s += c;
73     return s;
74 }
75 }
76
```

```
H:\work\JavaProg\2018Spring\WarmUp05>java Diamond
```

[illegible]



2. Write a static methods that remove all the tabs (`\t`) in a String and substitute a tab with needed blanks.

```
public static String noTabs (String s, int tabPosition);
```

For example, `noTabs( "\tabcde\t1234\txyz\tABCDEFGHijklmn\tOK\n", 8)` will return the String: `".....abcde...1234....xyz.....ABCDEFGHijklmn..OK\n"`. For clarity, using a `.` to present a blank.

And `noTabs( "\tabcde\t1234\txyz\tABCDEFGHijklmn\tOK\n", 4 )` will return the String: `"....abcde...1234....xyz.ABCDEFGHijklmn..OK\n"`.

```
H:\work\2018A\WarmUp05>javac NoTabs.java
H:\work\2018A\WarmUp05>java NoTabs
\tabcde\t1234\txyz\tABCDEFGHijklmn\tOK\n
      abcde   1234    xyz      ABCDEFGHijklmn  OK
..abcde.1234..xyz.ABCDEFGHijklmn..OK
...abcde.1234...xyz...ABCDEFGHijklmn.OK
....abcde...1234....xyz.ABCDEFGHijklmn..OK
.....abcde.....1234.xyz..ABCDEFGHijklmn.OK
.....abcde.1234..xyz...ABCDEFGHijklmn....OK
.....abcde..1234...xyz....ABCDEFGHijklmn.....OK
.....abcde...1234....xyz.....ABCDEFGHijklmn..OK
.....abcde....1234.....xyz.....ABCDEFGHijklmn....OK
.....abcde.....1234.....xyz.....ABCDEFGHijklmn.....OK
H:\work\2018A\WarmUp05>
```

```
1 public class NoTabs {
2     public static void main (String[] args) {
3         String t = "\\tabcde\\t1234\\txyz\\tABCDEFGH IJKLMN\\tOK\\n";
4         String s = "\\tabcde\\t1234\\txyz\\tABCDEFGH IJKLMN\\tOK\\n";
5         System.out.println( t );
6         System.out.print( s );
7         for (int n = 2; n <= 10; n++)
8             System.out.print( noTabs(s, n) );
9     }
10                                     // Why not s.charAt(i) here?
11     public static String noTabs (String s, int position) {
12         String result = "";
13         for (int i = 0; i < s.length(); i++)
14             result += s.charAt(i) != '\\t' ? s.substring(i, i+1) :
15                     blanks( position - result.length() % position );
16         return result;
17     }
18
19     public static String blanks (int n) {
20         String s = "";
21         while (n-- > 0) s += ".";    // use '.' instead of ' ' for clarity
22         return s;
23     }
24 }
```

3. (jhttp10, Exercise 5.29) *“The Twelve Days of Christmas” Song*. Write an application that uses repetition and switch statements to print the song “The Twelve Days of Christmas.” One switch statement should be used to print the day (“first,” “second,” and so on). A separate switch statement should be used to print the remainder of each verse. Visit the website [en.wikipedia.org/wiki/The\\_Twelve\\_Days\\_of\\_Christmas\\_\(song\)](http://en.wikipedia.org/wiki/The_Twelve_Days_of_Christmas_(song)) for the lyrics of the song. (12DaysOfChristmas.txt attached)

```
TwelveDaysOfChristmas.java X
1 public class TwelveDaysOfChristmas {
2     public static void main (String[] args) {
3         System.out.print( composeLyrics() );
4     }
5 }
```

```
6 public static String composeLyrics () {
7     final String[] ORDER = {
8         "", "first", "second", "third", "forth", "fifth", "sixth",
9         "seventh", "eighth", "ninth", "tenth", "eleventh", "twelfth"
10    };
11    String lyrics = "The Twelve Days of Christmas -- Lyrics\n\n";
12    for (int d = 1; d <= 12; d++ ) {
13        lyrics += "On the " + ORDER[d] + " day of Christmas,\n" +
14            "my true love sent to me\n";
15        switch (d) {
16            case 12 : lyrics += "Twelve drummers drumming,\n";
17            case 11 : lyrics += "Eleven pipers piping,\n";
18            case 10 : lyrics += "Ten lords a-leaping,\n";
19            case 9 : lyrics += "Nine ladies dancing,\n";
20            case 8 : lyrics += "Eight maids a-milking,\n";
21            case 7 : lyrics += "Seven swans a-swimming,\n";
22            case 6 : lyrics += "Six geese a-laying,\n";
23            case 5 : lyrics += "Five golden rings,\n";
24            case 4 : lyrics += "Four calling birds,\n";
25            case 3 : lyrics += "Three French hens,\n";
26            case 2 : lyrics += "Two turtle doves,\n" +
27                "And a partridge in a pear tree.\n\n";
28                break;
29            case 1 : lyrics += "A partridge in a pear tree.\n\n"; break;
30        }
31    }
32    return lyrics;
33 }
34 }
```

H:\work\JavaProg\2018Spring\WarmUp05>java  
The Twelve Days of Christmas -- Lyrics

On the first day of Christmas,  
my true love sent to me  
A partridge in a pear tree.

On the second day of Christmas,  
my true love sent to me  
Two turtle doves,  
And a partridge in a pear tree.

On the third day of Christmas,  
my true love sent to me  
Three French hens,  
Two turtle doves,  
And a partridge in a pear tree.

On the forth day of Christmas,  
my true love sent to me  
Four calling birds,  
Three French hens,  
Two turtle doves,  
And a partridge in a pear tree.

On the fifth day of Christmas,  
my true love sent to me  
Five golden rings,  
Four calling birds,  
Three French hens,  
Two turtle doves,  
And a partridge in a pear tree.

On the seventh day of Christmas,  
my true love sent to me  
Seven swans a-swimming,  
Six geese a-laying,  
Five golden rings,  
Four calling birds,  
Three French hens,  
Two turtle doves,  
And a partridge in a pear tree.

On the eighth day of Christmas,  
my true love sent to me  
Eight maids a-milking,  
Seven swans a-swimming,  
Six geese a-laying,  
Five golden rings,  
Four calling birds,  
Three French hens,  
Two turtle doves,  
And a partridge in a pear tree.

On the ninth day of Christmas,  
my true love sent to me  
Nine ladies dancing,  
Eight maids a-milking,  
Seven swans a-swimming,  
Six geese a-laying,  
Five golden rings,  
Four calling birds,  
Three French hens,  
Two turtle doves,  
And a partridge in a pear tree.

On the tenth day of Christmas,  
my true love sent to me  
Ten lords a-leaping,  
Nine ladies dancing,  
Eight maids a-milking,  
Seven swans a-swimming,  
Six geese a-laying,  
Five golden rings,  
Four calling birds,  
Three French hens,  
Two turtle doves,  
And a partridge in a pear tree.

On the eleventh day of Christmas,  
my true love sent to me  
Eleven pipers piping,  
Ten lords a-leaping,  
Nine ladies dancing,  
Eight maids a-milking,  
Seven swans a-swimming,  
Six geese a-laying,  
Five golden rings,  
Four calling birds,  
Three French hens,  
Two turtle doves,  
And a partridge in a pear tree.

On the twelfth day of Christmas,  
my true love sent to me  
Twelve drummers drumming,  
Eleven pipers piping,  
Ten lords a-leaping,  
Nine ladies dancing,  
Eight maids a-milking,  
Seven swans a-swimming,  
Six geese a-laying,  
Five golden rings,  
Four calling birds,  
Three French hens,  
Two turtle doves,  
And a partridge in a pear tree.