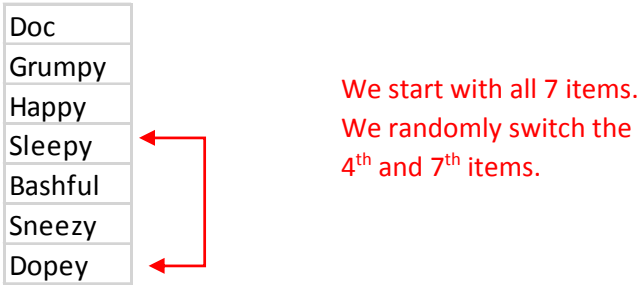
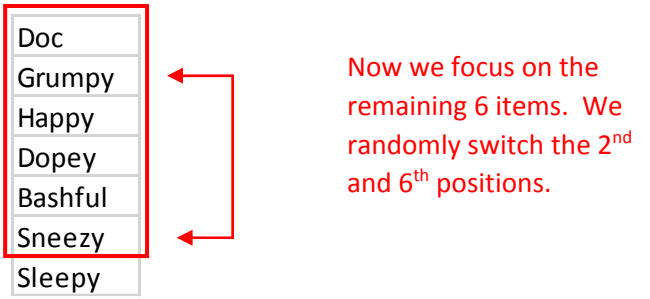
Durstenfeld's Algorithm

Durstenfeld's Algorithm is an efficient method to randomly organize a vector of elements. It might be used to randomize, for example, the play list on your iPod without repeating a song.

The steps below outline an example using the seven dwarves.



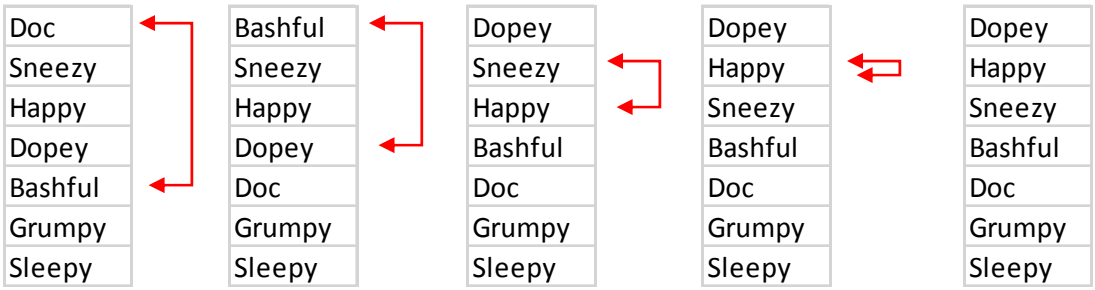
The first step is to choose a random number r between 1 and 7 (inclusive). Let's say we pick r = 4 (obviously, this will vary and that's what makes this a random process). You could use Excel's **RandBetween** function. We then swap the 4th and the 7th rows to create the following.



Next, we will choose a random number between 1 and 6 (so "Sleepy" is set for good in the 7th position). Let's say we get r = 2. Again, this will be random. We now swap the second item with the 6th item to obtain the following:

Doc
Sneezy
Happy
Dopey
Bashful
Grumpy
Sleepy

And we keep going, choosing a random number between 1 and 5 (my example uses r = 1 so we swap rows 1 and 5), then a random number between 1 and 4 (my example uses r = 1 again so we swap rows 1 and 4), then a random number between 1 and 3 (my example uses r = 2 so we swap rows 2 and 3), and finally a random number between 1 and 2 (inclusive, my example uses 2, so we swap rows 2 and 2 – this does nothing). The figure below depicts what is happening as we do this.



The approach is to count the number of elements to be randomized (let's call this n), then iterate through an index variable (let's call this j). You may have noticed a pattern that emerges in a count-controlled iteration (think **For…Next** loop!). If we use an index j then we always choose a random number between 1 and (n – j + 1) (convince yourself of this as j goes from 1 to 7). Second, we always swap the $(n - j + 1)^{th}$ element with our randomly assigned element.

Swapping is easy in VBA. If I wanted to swap element A(2) with A(5) you could just do the following:

```
temp = A(2)
A(2) = A(5)
A(5) = temp
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