

An Introductory Tutorial:
Learning R for Quantitative Thinking in the Life Sciences

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Chapter 6

More modeling in R: Getting used to using distributions:

R has a function that allows one to generate samples based on distributions such as the normal distribution. Compile the following:

```
> # The below statement generates 1000000 samples from a normal distribution  
> #   with a mean of 50 and a standard deviation of 3  
> true.pop = rnorm(n=1000000,mean=50,sd=3)
```

```
> # will plot a histogram of your data  
> hist(true.pop) > mean(true.pop)
```

```
> # calculates the standard deviation of true.pop (your 1000000 data points)  
> sd(true.pop)
```

```
> # calculates the mean of true.pop (your 1000000 data points)  
> mean(true.pop)
```

Exercise

Generate 100 subsamples from a normal distribution with a mean of 50 and a standard deviation of 3, each subsample being 50 data points.

Calculate the mean and standard deviation for each of the 100 subsamples.

Generate a matrix (nrow=100, ncol = 2) populated with a column of the mean values from your subsamples and a column populated with your standard deviations.

Create a histogram of each column of this matrix.

Exercise

Create a vector on ten values, the first value equal to 0.3. For values 2:10 in your vector, generate 9 population growth values (lambda) using the `rnorm()` function with a mean lambda value of 0.3 and a standard deviation of 0.05. These ten values (in your vector) are your values for population growth per month.

Populations of lemmings grow exponentially on a monthly basis through much of the spring and summer. Populations emerge from hibernation on April 1st and their first lambda population growth is calculated in May. That is, May's population = lambda*April's population.

Populations hibernate in starting on September 1 (populations grow over 5 increments).

Snow snakes eat 90% of the hibernating population every year. For example, on September 1st in 2009, 430 lemmings started hibernating. On April 1st, 2010 all but 43 had been eaten by snow snakes.

On April 1st in 2012, there were 100 lemmings near the cliffs of insanity (near Galway, Ireland).

Calculate the estimated number of lemmings on September 1st 2022 for each of your 10 lambda values (monthly population growth values).

Plot the populations over the time (summer months only).