

# Exercises

## Exercise 5: Basic programming in R

Read Chapter 7 to help you complete the questions in this exercise.

1. Create a function to calculate the area of a circle. Test the function by finding the area of a circle with a diameter of 3.4 cm. Can you use it on a vector of data?
2. Write a function to convert fahrenheit to centegrade ( $oC = (oF - 32) \times 5/9$ ). Get your function to print out your result in the following format: "Farenheit : *value of oF* is equivalent to *value oC* centigrade."
3. Create a vector of normally distributed data, of length 100, mean 35 and standard deviation of 15. Write a function to calculate the mean, median, and range of the vector, print these values out with appropriate labels. Also get the function to plot a histogram (as a proportion) of the values and add a density curve.
4. Write a function to calculate the median value of a vector of numbers (yes I know there's a `median()` function already but this is fun!). Be careful with vectors of an even sample size, as you will have to take the average of the two central numbers (hint: use modulo `%%2` to determine whether the vector is an odd or an even size). Test your function on vectors with both odd and even sample sizes.
5. You are a population ecologist for the day and wish to investigate the properties of the Ricker model. The Ricker model is defined as:

$$N_{t+1} = N_t \exp \left[ r \left( 1 - \frac{N_t}{K} \right) \right]$$

5. (cont) Where  $N_t$  is the population size at time  $t$ ,  $r$  is the population growth rate and  $K$  is the carrying capacity. Write a function to simulate this model so you can conveniently determine the effect of changing  $r$  and the initial population size  $N_0$ .  $K$  is often set to 100 by default, but you want the option of being able to change this with your function. So, you will need a function with the following arguments; `nzero` which sets the initial population size, `r` which will determine the population growth rate, `time` which sets how long the simulation will run for and `K` which we will initially set to 100 by default.

End of Exercise 6