

# Exercise 9: Evolutionary Theory: Preliminaries

Summer Term 2024

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This exercise just looks at some theoretical issues that serve as preliminaries for later theoretical considerations.

**Review:** Probability and statistics:

1. What is a probability?
2. What is an average? How do you calculate it?
3. What is the standard deviation? How do you calculate it?

**To Do:** In this exercise you have to do some explorative programming.

**Tasks:**

1. Write a little program that prints 100 lines each of which should contain the line number and one Gaussian-distributed random number. Plot these numbers (e.g., `gnuplot` in Linux or `excel` in Windows).
2. Reuse the program but print the squares of the random numbers. Do a similar plot.
3. Now, instead of printing 100 lines with a random number or its squares, respectively, print the *sum* of the random numbers and the sum of its squares. Please, complete the following table in which  $z_i$  denotes  $N(0,1)$ -distributed random numbers:

#	1	4	16	25	100	10000
$\sum z_i$						
$\sum z_i^2$						

Why does all this happen?

Have fun, Theo and Ralf.