Excercise 1

Read “Using R for Data analysis and Graphics”, pages 1-14. Most of it covers stuff we talked about in class.

As you’ll notice, the following exercises are of increasing difficulty. Try to do them all... it should be fun!

1. Create a sequence of numbers from 5 to 97

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2. Make a sequence of numbers from 5 to 95 in steps of 5. (You can try for several different solutions...)

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3. Look up the help of the function seq(), and find more solutions to the above question.

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Please write out the names of the parameters you use in full.

4. A population of individuals of size 20 that reproduces asexually using the Fisher-Wright model reached a state where 4 individuals are offspring of a certain organism 100 generations ago, 6 are the offspring of a second organism from that generation, and 10 from a third.

Create a vector that contains this population

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Create the next generation of offspring by sampling from the above population. How many offspring of the 1st 2nd and 3rd organism remain?

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5. A population contains two gentypes. The first is twice as likely to produce offspring as the second. The initial population size is 10,000, with 40% of the fitter type, and 60% of the less fit type. Create a next generation of offspring

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Continue from that generation for 10 more generations, and note the frequencies of the two types at every stage.

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6. A population starts with 100 different genotypes, whose chance to survive are proportional to the numbers 1.01, 1.02, 1.03, ... ,2.00. Sample the next generation

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print out the survival chances that you used for the 100 individuals

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What is the average survival chance?

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What is the variance of the survival chance? (function var()).
print the survival chance of the individuals that made it to the next generation

What is the mean survival chance of the individuals that made it?

By how much did the survival chance increase?

Fisher’s fundamental theorem states that the survival chance increases by the variance of the survival chance divided by the mean survival chance. Did it hold here?

7. A sexual population is reproducing. The sperm contain 30% genotype 1, and 70% genotype 2, and the eggs 40% and 60%. Create 100 random diploid offspring, and count how many are of types 1,1 or 1,2 or 2,2.