Molecular Population Genetics (Hardy-Weinberg)

Lab Assignment 2 (due 17 September, 2014) – email me this sheet along with script

Your Name:

1. The genotypic frequencies in a population sample are AA (0.2), AG (0.1), and GG (0.7).

a. Without making a formal statistical test, do you think these appear to be Hardy-Weinberg proportions?

b. What are the gene frequencies of the two gametes produced by this population? Calculate the genotypic frequencies of the next generation assuming random mating.

c. Assume the genotypic frequencies in this next generation represent the “true” frequencies. You then collect a population sample that contains 120 AA, 260 AG, and 20 GG genotypes. Perform a likelihood ratio test of the null hypothesis that the population is in Hardy-Weinberg equilibrium. In addition to using a X2 table, generate the null distribution for the likelihood ratio test statistic using a Monte Carlo simulation of 5000 samples of 400 individuals from the “true” frequencies.

Submit your python script, a histogram of the distribution that also illustrates where the likelihood ratio test statistic lies, and a paragraph explaining the results. Note: you don’t have to make your histogram using a python script --- you can use Excel, Chart, etc.

d. Compare your results to what you would have concluded using a X2 table.

e. Make your histogram using python. 2) create a similar problem as above, but with more degrees of freedom

