

Probability module Day 1 at-home exercises

Please do the following exercises at home before class. Similar exercises will be done in class the next day and turned in for a grade.

(These exercises are based exercises in de Groot.)

1. A nucleotide symbol is selected at random from a DNA sequence file. If the probability that a G or C will be selected is 0.4, what is the probability that an A or a T will be selected?
2. If the probability that student A will fail a certain test is 0.5, the probability that student B will fail is 0.2, and the probability that both will fail is 0.1, what is the probability that at least one of the two will fail? What is the probability that exactly one will fail?
3. Consider the 3rd base position in the high-affinity DNA-binding sites for Protein X. Suppose the numbers of As, Cs, and Gs, and found in this position are equal, but the number of Ts is twice the number of As (and twice the Cs and twice the number of Gs). If a particular high-affinity binding site for Protein X is selected at random from a list of all such binding sites, what is the probability that it will contain a C in the 3rd position?
4. Suppose a given DNA vector is 50% AT and 50% GC. If a nucleotide is chosen at random from the vector three times, what is the probability that no G or C will be chosen?

