1016-345-01
Probability and Statistics for Engineers

Problem Set 1

Assigned 2013 March 5
Due 2013 March 12

Show your work on all problems!

1 Devore Chapter 2, Problem 14

Note that problem 2.14 is different in the seventh and eighth editions of Devore. Be sure to do the problem from the eighth edition.

2 Devore Chapter 2, Problem 34

Note that problem 2.34 is different in the seventh and eighth editions of Devore. Be sure to do the problem from the eighth edition.

3 Devore Chapter 2, Problem 60

4 Devore Chapter 2, Problem 110

5 Computational Exercise (Extra Credit)

This exercise lets you see how the relative frequency an outcomes in a repeated experiment approximates the probability of that outcome.

Generate a sequence of $N = 1{,}000{,}000$ random integers, each equally likely to be 1, 2, 3, 4, or 5. Define n_k to be the number of fives in the first k integers in your sequence, so that n_k/k is the relative frequency of fives among the first k integers. By the definition of probability as a limiting relative frequency, $\lim_{k\to\infty} \frac{n_k}{k} = \frac{1}{5} = .2$

a. Plot $\frac{n_k}{k}$ versus k for $1 \le k \le 50$.
b. Plot $\frac{n_k}{k}$ versus k for $1 \le k \le 1000$.
c. Produce a semilog plot of $\frac{n_k}{k}$ versus k, using a logarithmic scale for $1 \le k \le 10^6$.

Hint: if you use matlab or the python library NumPy for your calculations, you may find the `cumsum()` function useful, along with the construction `d==5`, which will produce an array of true (1) and false (0) values of the same size as `d`.