18.443. Pset 1. Due Wednesday, September 13th.

(1) Prove that

$$\lim_{n\to\infty}\binom{n}{k}\left(\frac{\lambda}{n}\right)^k\left(1-\frac{\lambda}{n}\right)^{n-k}=\frac{\lambda^k}{k!}e^{-\lambda}.$$

(2) Compute $\mathrm{E}X, \mathrm{E}X^2$ and $\mathrm{Var}(X)$ for $N(\mu,\sigma^2)$, $B(p)$, $E(\alpha)$, $\Pi(\lambda)$, $U(0,\theta)$.

(3) Generate a sample X of size 100 from $N(\mu=5,\sigma^2=4)$. Compute sample mean and sample standard deviation of this sample using Matlab functions 'mean(X)' and 'std(X)' or 'std(X,1)'. What is the difference between 'std' and 'std(,1)' (read Matlab help)? Plot on the same graph an empirical c.d.f. of your data using 'cdfplot' function and a normal c.d.f. with estimated mean and standard deviation. Print out the graph and write a sequence of all Matlab commands in this exercise.