

# Problem Set 5

Due Mon 11/21/2011

1. (Computer exercise) Do the computer exercise described in Lecture note 15 for  $F_X$  being (1) Bern(0.5), (2) Bern(0.01), (3) t(2), (4) t(4) and one distribution of your choice.
2. Prove the vector version of Lemma 1 in Lecture note 15.
3. Let  $\{X_{1i}, X_{2i}\}_{i=1}^n$  be an i.i.d. sample from a population distribution with mean  $\mu = (\mu_1, \mu_2)$  and variance matrix  $\Sigma = \begin{pmatrix} \sigma_1^2 & \rho\sigma_1\sigma_2 \\ \rho\sigma_1\sigma_2 & \sigma_2^2 \end{pmatrix}$  where  $\sigma_1^2 > 0$  and  $\sigma_2^2 > 0$ .
  - (1) Propose a consistent estimator for  $\rho$ , (i.e., an estimator  $\hat{\rho}_n \rightarrow_p \rho$ ) and show that it is consistent.
  - (2) Derive the asymptotic distribution of your proposed estimator (properly recentered and rescaled).
4. 4.2.2(c) of HMC
5. 4.4.1 of HMC
6. 4.4.9 of HMC
7. 4.5.2 of HMC
8. 4.5.3 of HMC