

In the name of God

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STOCHASTIC PROCESSES

Exercise Set 3

(Date Due: 1396/12/20)

1. Markov process:

**A** : In a Markov process for having on and off lamp, the conditional probability density for different situations are  $p(\text{on}; t_n | \text{off}; t_{n-1}) = A$  and  $p(\text{off}; t_n | \text{on}; t_{n-1}) = B$ . If the lamp to be turn on at  $t_1$  compute the probability having light lamp at  $t_n$ .

**B** : Compute the Markov scale of attached data.

2. Multivariate Gaussian PDF: Suppose to have a  $N$ -dimensional stochastic variable with multivariate Gaussian PDF:  $p(X) = \sqrt{\frac{\text{Det}(A)}{(2\pi)^N}} \exp\left(-\frac{X^\dagger \cdot A \cdot X}{2}\right)$ . Show that  $p(x)$  is normalize. i.e.  $\int d^n X p(X) = 1$

Good luck, Movahed

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