

In the name of God

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STOCHASTIC PROCESSES

Exercise Set 5

(Date Due: 1397/01/17)

1. For a random-walk suppose that probability distribution of each jump is represented by $p(s) = \frac{1}{1+s^\alpha}$, in this case:
 - (a) Determine the $p(x)$ after N -step.
 - (b) Compute $\langle x \rangle_N$
 - (c) Compute $\langle x^2 \rangle_N - \langle x \rangle_N^2$
 - (d) What about $p(x)$ for $N \rightarrow \infty$?
2. Investigate the Polya's theorem for previous question. What is the condition on α to have infinite probability of finding random-walk at distance R .
3. For standard random-walk model we find $\sigma_x(t) \sim t^\alpha$ with $\alpha = 0.5$. Explain how one can derive dispersion for random-walk position with $\alpha \neq 0.5$.

Good luck, Movahed
