In the name of God

Department of Physics
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COMPUTATIONAL PHYSICS

Exercise Set 6

(Date Due: 1397/01/17)

1. Simulate a 1-dimensional Random-Walk and Compute mean and variance of its position fort the case $P(s) = \frac{1}{\sqrt{2\pi\sigma^2}} \exp\left(-\frac{s^2}{2\sigma^2}\right)$.

2. Simulate a particle based on Langevin equation and then compute:
A: $\langle v(t) \rangle$.
B: $\langle v(t)^2 \rangle$.
C: $\langle v(t_1) v(t_2) \rangle$.
D: $\langle x(t) \rangle$.
E: $\langle x(t)^2 \rangle$.
F: $\langle x(t_1) x(t_2) \rangle$.
G: $p(v)$.
H: Compare all of above parts with theoretical predictions.

3. For cooling differential equation, calculate analytical solution as well as numerical one. Then plot Δ as a function of discretization parameter.

Good luck, Movahed