

Quiz 1
4/13/07
Physics 219

A one dimensional random walk is composed of two kinds of steps. The even steps are taken with a probability density of

$$w_1(s) = (\delta(s - l) + \delta(s + l))/2$$

where s is the displacement and l is a constant. The odd steps are taken with a probability density

$$w_2(s) = \frac{e^{-\frac{s^2}{2\sigma^2}}}{\sqrt{2\pi\sigma^2}}$$

where σ^2 is the variance of this distribution. All steps are all independent of each other.

- a** (5 points) Find the exact expression for the probability density $\mathcal{P}(x)$ for the total displacement x after $2N$ steps. Your answer should be in the form of a summation.
- b** (5 points) Find the exact variance and the mean of the total displacement.