**1. The Fourier Transform of the probability density, P(x) is**

+∞

**T(k) = ∫ (e^(ikx)}\*P(x) dx**

**-∞**

and is called the characteristic function of the random variable x. Let F(k) = log (T(k)) and show that

1. F(0) = 0
2. F’(0) = i<x>
3. F’’ (0) = i<(Δx)^2>

2. Take P(x) to be the Gaussian distribution:

**P(x) = {1/[(2 Pi)^.5 \* (σ)]}\* e^-{(x-xo)^2/(2σ^2)**

Calculate the Characteristic function (see above) and obtain <x> and <(Δx)^2> using the F(x) from part 1 above.