In the name of God

Department of Physics
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ADVANCED TOPICS IN STATISTICAL PHYSICS II

Exercise Set 1

(Date Due: 1394/11/30)

1. Using the underlying data set I, compute the mean, variance. Make 2 distinct series and called them as x and z. Assume some arbitrary function which is given by $y = f(x, z)$. Now investigate the error propagation in this field.

2. χ^2-square analysis: Suppose that $\chi^2 = \sum_{i=1}^{N} \frac{[y_i - Y_{the.}(x_i;\Theta)]^2}{\sigma_{x_i}^2 + \sigma_{y_i}^2}$, and $Y_{the}(x, \Theta) = mx + b$. Determine the best fit values of m and b. By taking into account σ_{x_i} as dispersion of x's, compute the intrinsic errors of m and b.

3. Using simple method for PDF, compute the PDF of previous data sets. Improve your approach for PDF computation using second method mentioned in class. Investigate your results for various values of ΔX.

4. Find different kernels used in calculating probability distribution function and report one of them. Base on kernel you found for previous question to recalculate probability distribution function for the given data set II.

5. Show that the multivariate PDF is normalized.

Good luck, Movahed