Computational Physics

Homework - May 13

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In the class, we discussed the likelihood fits and pseudo experiments.

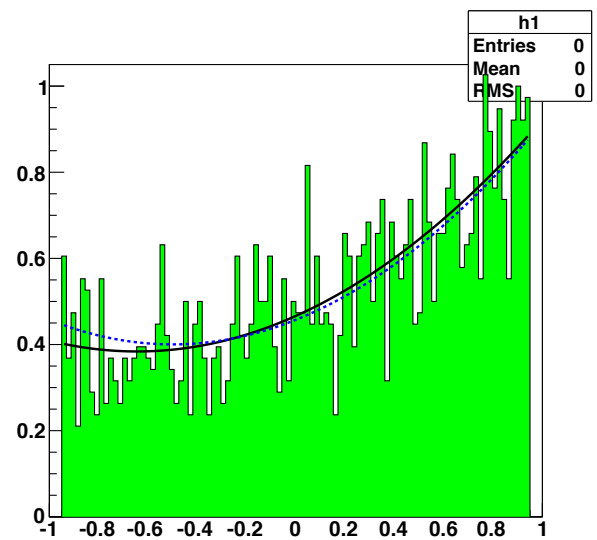
For example, we the following p.d.f.,

$$f(x;\alpha,\beta) = \frac{1+\alpha x+\beta x^2}{(x_{\max}-x_{\min}+\frac{\alpha}{2}(x_{\max}^2-x_{\min}^2)+\frac{\beta}{3}(x_{\max}^3-x_{\min}^3)}$$

we did the likelihood fits.

1. Generate random numbers distributed as the above p.d.f. using any techniques that you learned or you know. Generate 1000 numbers with your choice of x_{min}, x_{max}, α and β.

2. Perform a likelihood fit to get a plot similar to what I showed in the class. Show the fit results.



3. Repeat the likelihood fits with 10000, and 100000 random numbers. How do your errors behave when you increase the size of random numbers. Do they have 1/sqrt(N) behavior?

4. Let's come back with the case of 1000 random numbers. Perform 500 pseudo experiments, plot the distributions of 500 α and β fits and discuss results.

5. Get the pull distributions of α and β. Do they look reasonable?