

Computational Physics

Homework - c/c++ language/ROOT/unix

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1. ROOT: create a histogram with the number of bins = 5 and the range in [0,10]. I have a data of $\mathbf{x} = \{1,5,9,3,2,4,5,1,6,9,4,2,2,3,4,8,9,4,5,6,3,2,6,5,4,3,4,5,2\}$. Make a histogram from this set \mathbf{x} and make a plot (you can save it as pdf or other graphics format from files tab.) What are mean and variance of the distribution?

2. ROOT: run `$ROOTSYS/tutorials/hist/hsum.C` and understand the code. Explain what

`xmain = gRandom->Gaus(-1,1.5);` does.

(Hint. You can click to see what Gaus does from <http://root.cern.ch/root/html/tutorials/hist/hsum.C.html>)

3. ROOT: a p.d.f. function $f(x) = a (x^2 + 0.5)$ is defined in $[0,3]$. Determine values of a and b . Draw $f(x)$ and its cumulative functions.

4. ROOT: Have a look at <http://root.cern.ch/root/html/tutorials/graphs/gerrors.C.html> and draw a graph with errors when the error of the data is $\sqrt{\text{data}}$ (you assume the central values freely).

5. Unix: to list files in the present directory, one can type in
`ls -alf`

What do `-alf` options do? Explain each of them in detail.

6. c: write a c program that compute $\frac{N!}{n!(N-n)!}$. We need it for the calculation of binomial distribution in next classes. Try to smart so that it does not diverge when N is large ($N \geq n$).

7. c++: there is a STL container called `list`. Define the following line

```
list<int> LIST;
```

in your main program. Insert 5 numbers in the LIST, loop over the LIST, and print out each content.