

Numerical Recipes for Astrophysics

Solutions hand-in assignment-2

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Abstract

The current document contains the solutions for the second hand-in assignment of Numerical Recipes. Each main question 1, 2, 3, ..., 7 is given its own section and contains a subsection for each sub-question (1.a, 1.b, ..., 1.f). A main question always ends with a final subsection that contains two segments of code. The first segment contains the full code of the program that executes the sub-questions. The second segment contains the shared modules (if any) used by the sub-question. A sub-question itself always starts with a short summary of the question that needs to be answered followed by an explanation of how the problem is solved. Next, the code and its output are provided. Finally the output is discussed if relevant.

1 - Normally distributed pseudo-random numbers

Question 1.a

Problem

Write a random number generator that returns a random floating-point number between 0 and 1. At minimum, use some combination of an MWC and a 64-bit XOR-shift. Plot a sequential of random numbers against each other in a scatter plot (x_{i+1} vs x_i) for the first 1000 numbers generated. Also plot the value of the random numbers for the first 1000 numbers vs the index of the random number, this mean the x-axis has a value from 0 through 999 and the y-axis 0 through 1). Finally, have your code generate 1,000,000 random numbers and plot the result of binning these in 20 bins 0.05 wide.

Solution

bleh