

Homework 4

1. (25 points) **Ex. 4.1.11:** Calculate \bar{x} and s by hand, using the two-pass algorithm, the one-pass algorithm, and Welford's algorithm in the following two cases.
 - (a) Data based on $n = 3$ observations: $x_1 = 1, x_2 = 6, x_3 = 2$.
 - (b) The sample path $x(t) = 3$ for $0 < t \leq 2$, and $x(t) = 8$ for $2 < t \leq 5$, over the time interval $0 < t \leq 5$.

2. (25 points) **Ex. 4.2.2:** (a) Generate the 2000-ball histogram in Example 4.2.2.
 - (b) Generate the corresponding histogram if 10,000 balls are placed, at random, in 1000 boxes.
 - (c) Calculate the histogram mean (\bar{x}) and the histogram standard deviation (s) for both the 2000 balls and the 10,000 balls.

3. (25 points) **Ex. 4.2.11:** A test is compiled by selecting 12 different questions, at random and without replacement, from a well-publicized list of 120 questions. After studying this list you are able to classify all 120 questions into two classes, I and II. Class I questions are those about which you feel confident; the remaining questions define class II. Assume that your grade probability, conditioned on the class of the problem, is

	A	B	C	D	F
class I	0.6	0.3	0.1	0.0	0.0
class II	0.0	0.1	0.4	0.4	0.1

Each test question is grade on an $A = 4, B = 3, C = 2, D = 1, F = 0$ scale and a score of 36 or better is required to pass the test.

 - (a) If there are 90 class-I questions in the list, use Monte Carlo simulation and 100000 replications to generate a discrete-data histogram of scores.
 - (b) From this histogram, what is the probability that you will pass the test?

4. (25 points) **Ex. 4.3.5:** (a) Construct a continuous-data histogram of the service times (in `ac.dat` - Exercise 1.2.6).
 - (b) Compare the histogram mean and standard deviation with the corresponding sample mean and standard deviation, and justify your choice of the histogram parameters a, b and either k or δ .