Problem 1:
Measurement data was read 1 byte at a time. Code is in the *problem1.py* file.

(a) The results for the Naive approach are:
Mean is: 133.70021891
Variance is: 1.87077066678632
Standard deviation is: 1.3677611877759654
36222.30987499643 (Time in miliseconds)

(b) The results for the Welford's algorithm are:
Mean is: 133.70021891001224
Variance is: 1.870770666787051
Standard deviation is: 1.3677611877762328
32922.72952500207 (Time in miliseconds)

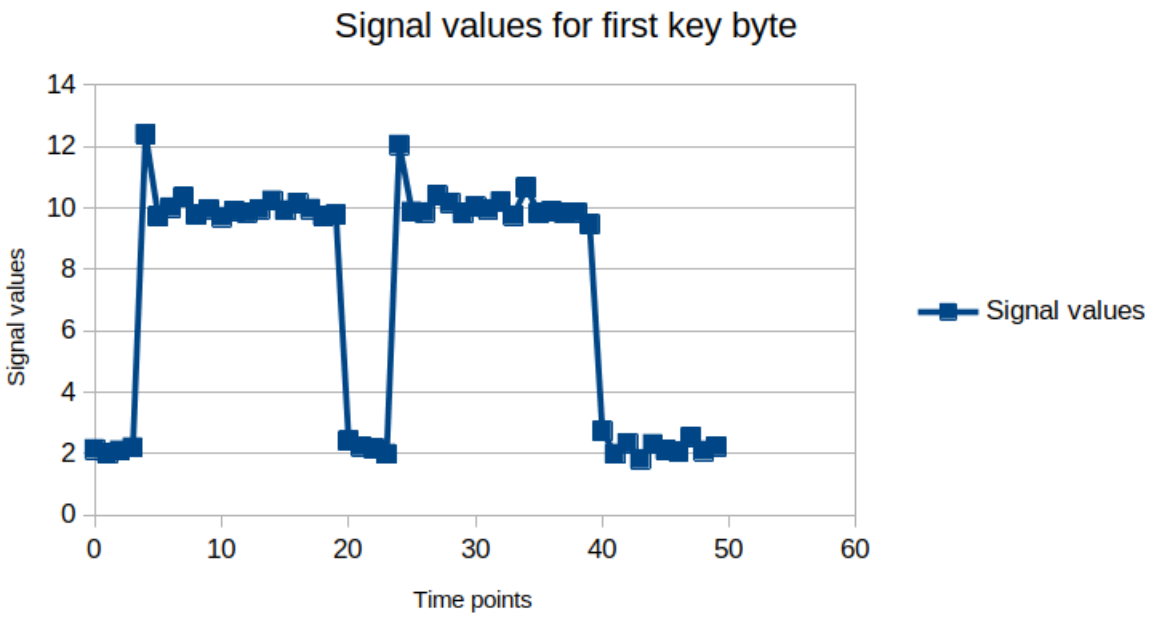
(c) The results for One-Pass method are:
Mean is: 133.70021891001224
Variance as per formula defined in the paper is: 1.870770648079344
Standard deviation is: 1.3677611809374266
37649.206251007854 (Time in miliseconds)

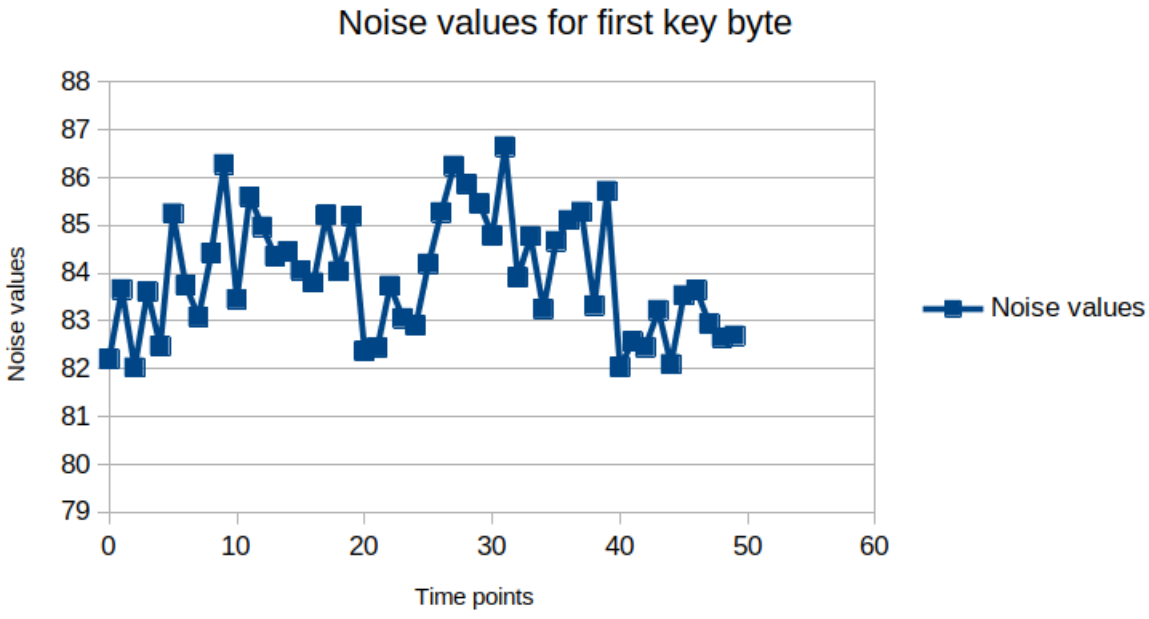
(d) The results for the Histogram method are:
Mean is: 133.70021891
Variance is: 1.8707706480784119
Standard deviation is: 1.367761180937086
39373.44615999609 (Time in miliseconds)

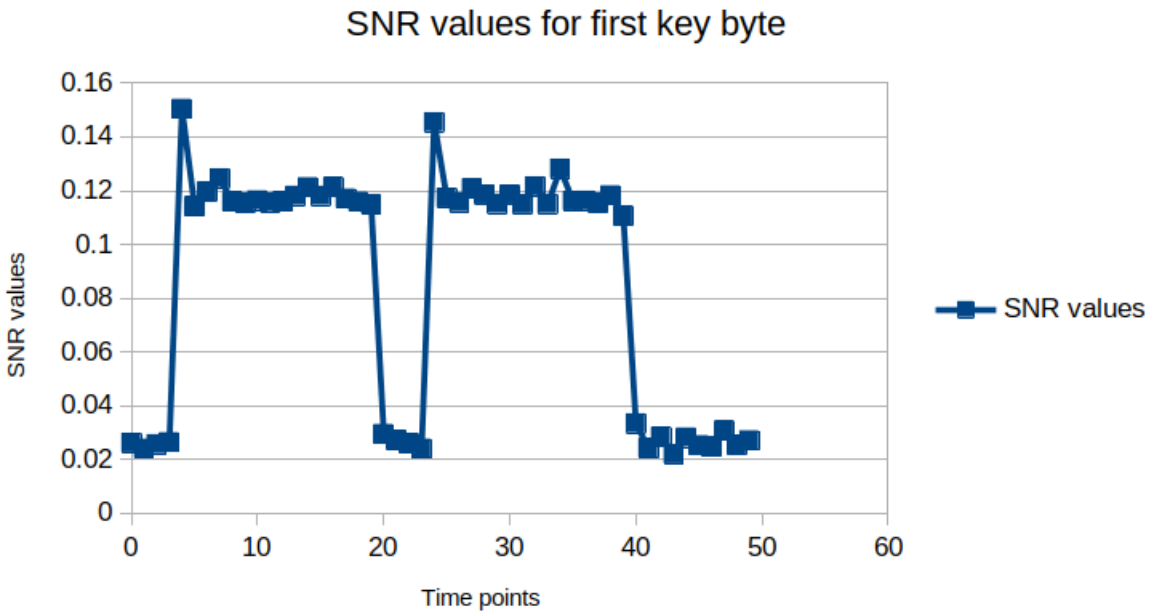
(e)
It turns out that Welford's algorithm was the fastest. One-Pass method and Histogram method had comparable times and were slightly slower than the Naive method.

Problem 2:
Code is in *problem2.py* file.
The (256) values of the numerator(Signal), denominator(Noise), and SNR for each point in time for *only the first key byte* are given in the files signal.txt, noise.txt, and snr.txt

The plots are shown below:







Problem 3:

The extracted key bytes in decimal notation are:

237 58 24 116 22 40 132 182 197 231 224 64 215 78 87 187

The extracted key bytes in hexadecimal notation are:

0xED 0x3A 0x18 0x74 0x16 0x28 0x84 0xB6 0xC5 0xE7 0xE0 0x40 0xD7 0x4E 0x57 0xBB

The code is in *problem3.py* file.

The fastest running time on my machine was 68.3 seconds.