Measurements are drawn from a Gaussian distribution with variance
\sigma^2
σ
2
. Which of the estimators below will provide the 'best' estimate of the true value of a parameter? Select any/all that apply:
1 / 1 point

Maximum Likelihood

Correct
Correct! By definition, a maximum likelihood estimator will find the parameter value with the greatest likelihood of being the 'true' value. ML and LS estimators are equivalent in this case.

Least Squares

Correct
Correct! Since all of the variances are identical, ordinary least squares can be used.

Weighed Least Squares

Correct
Correct! Even when all variances are identical, weighted least squares can be applied.
2.
Question 2
Which of the following statements are correct? Select any/all that apply:
2 / 2 points

When measurements are drawn from a non-Gaussian distribution, a maximum likelihood estimator produces the same values as weighted least squares.

Least squares estimators are significantly affected by outliers.

Correct

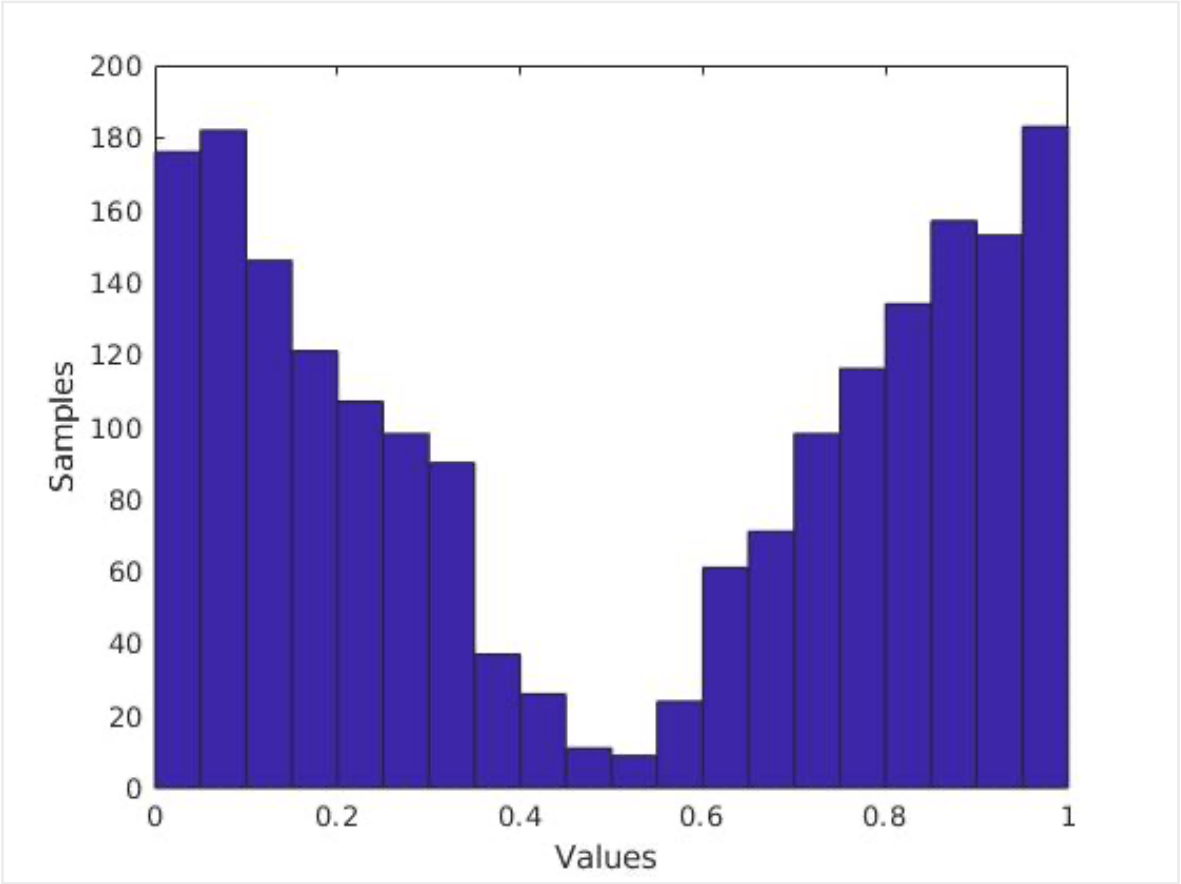
Correct! Outliers are not well handled by least squares estimators, since these estimators minimize the sum of *squared* errors.

When measurement noise comes from a large number of independent sources, a least squares estimator can be used.

Correct
Correct! The Central Limit Theorem states that when a noise comes from a large number of independent sources, the noise distribution will tend towards a Gaussian distribution.

3.

Question 3



Given the above histogram of noisy measurements, it is appropriate to use a LS estimator?

1 / 1 point

True

False

Correct
Correct! The distribution of the measurements is clearly not Gaussian, which suggests that least squares will do a poor job.
4.
Question 4
Looking at the histogram in the previous question, what could be the reason for such a distribution of measurements? Select any/all that apply:
1 / 1 point

The measured value might be changing.

Correct
Correct! If the measured value is changing (e.g., perhaps switching between two discrete values), the histogram will have multiple peaks.

There is an outside disturbance affecting the sensor.

Correct
Correct! Even if the measured value is static, a disturbance affecting the sensor (e.g., unmodeled vibrations or someone moving the sensor) might cause significantly different measurements to be produced.

The measurement is affected by zero mean Gaussian noise.