In Class Problem Typical Error

- A variable has a standard deviation of $\sigma = .15$
 - How many samples N, do I need to use in the estimate of the mean, to have a typical error of the estimate equal to .01?

In Class Problem **Typical Error**

- A variable has a standard deviation of $\sigma = .15$
 - How many samples do I need to average to estimate the mean to within a typical error of .01?

$$Typical\ Error = \sigma_{estimate} = \frac{\sigma}{\sqrt{N}}$$

Solving for N:

$$N = \left(\frac{\sigma}{.01}\right)^2 = \left(\frac{.15}{.01}\right)^2 = 225 \text{ samples}$$

Given two signals with the following statistics:

Signal 1
$$\mu_1 = 2, \sigma_1 = .5$$

Signal 2 $\mu_2 = 1, \sigma_2 = .125$

- Compute their individual SNR's
- Compute the SNR of the sum of the 2 signals

Assume two signals with the following probabilities:

Signal 1
$$\mu_1 = 2, \sigma_1 = .5$$

Signal 2 $\mu_2 = 1, \sigma_2 = .125$

Compute their individual SNR's

$$SNR_1 = \frac{\mu_{1^2}}{\sigma_{1}^2} = \frac{4}{.25} = 16$$

 $SNR_2 = \frac{\mu_{2^2}}{\sigma_{2^2}} = \frac{1}{.0156} = 64$

Compute the SNR of the sum of the 2 signals

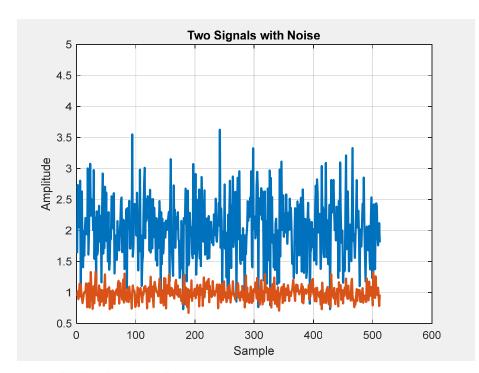
Signal 1
$$\mu_1 = 2$$
, $\sigma_1 = .5$ $SNR_1 = 16$
Signal 2 $\mu_2 = 1$, $\sigma_2 = .125$ $SNR_2 = 64$

Then:

$$\mu_{total} = \mu_1 + \mu_2 = 3$$
 $\sigma_{total} = \sqrt{\sigma_1^2 + \sigma_2^2} = .5154$
$$SNR_{total} = \frac{3^2}{.5154^2} = 33.88$$

$$\mu_1 = 2, \sigma_1 = .5$$

$$\mu_2 = 1, \sigma_2 = .125$$



$$\mu_{total} = \mu_1 + \mu_2 = 3$$

$$\sigma_{total} = \sqrt{\sigma_1^2 + \sigma_2^2} = .5154$$

