Definition 2.1 – Unbiased estimator
Any estimator $\hat{\boldsymbol{\theta}} = \hat{\boldsymbol{\theta}}(\mathbf{Y})$ is said to be *unbiased* if $E[\hat{\boldsymbol{\theta}}] = \boldsymbol{\theta}$ for all $\boldsymbol{\theta} \in \Theta^k$.

Definition 2.2 – Consistent estimator
An estimator is *cosistent* if the sequence $\boldsymbol{\theta}_n(\mathbf{Y}$ if estimators for the parameter $\boldsymbol{\theta}$ converges in porbability to the true value $\boldsymbol{\theta}$. Otherwise the estimator is said to be inconsistent.

Definition 2.3 – Minimum mean square error
An estimator $\hat{\boldsymbol{\theta}} = \hat{\boldsymbol{\theta}}(\mathbf{Y})$ is said to be *uniformly minimum mean square error* is

$$E\left[(\hat{\boldsymbol{\theta}}(\mathbf{Y}) - \boldsymbol{\theta})(\hat{\boldsymbol{\theta}}(\mathbf{Y}) - \boldsymbol{\theta})^T\right] \leq E\left[(\tilde{\boldsymbol{\theta}}(\mathbf{Y}) - \boldsymbol{\theta})(\tilde{\boldsymbol{\theta}}(\mathbf{Y}) - \boldsymbol{\theta})^T\right] \tag{1}$$

for all $\boldsymbol{\theta} \in \Theta^k$ and all other estimators $\tilde{\boldsymbol{\theta}}(\mathbf{Y})$.