a/s/m

Actuarial Study Materials

Learning Made Easier

Flashcards for CAS Exam MAS-I

1st Edition, Second Printing

★★★★

Definition of bias

$$\mathrm{bias}_{\hat{\theta}}(\theta) = \mathbf{E}[\hat{\theta}] - \theta$$

★★★

Bias of sample mean

0

★★★

Bias of biased sample variance

$$\mathrm{bias}_{\hat{\sigma}^2}(\sigma^2) = -\frac{\sigma^2}{n}$$

★★★★

Definition of consistency

***Consistency** means that the probability that the estimator is different from the parameter by more than ϵ goes to 0 as the sample size goes to infinity.*

★★★

Sufficient condition for consistency

Estimator is asymptotically unbiased and its variance goes to 0 as the sample size goes to infinity.

★★★

Definition of relative efficiency of estimator θ_1 to estimator θ_2

120F

$$\frac{\operatorname{Var}(\hat{\theta}_2)}{\operatorname{Var}(\hat{\theta}_1)}$$

★★★★

Definition of mean square error of estimator

Estimator Quality ★★★★

$$\mathrm{MSE}_{\hat{\theta}}(\theta) = \mathbf{E}[(\hat{\theta} - \theta)^2]$$

Lesson 25, page 301, formula (25.3) 121B

★★★★

Formula for mean square error

122F

Estimator Quality ★★★★

$$\mathrm{MSE}_{\hat{\theta}}(\theta) = \mathrm{bias}_{\hat{\theta}}(\theta)^2 + \mathrm{Var}(\hat{\theta})$$

Lesson 25, page 301, formula (25.4) 122B

★★

Definition of UMVUE

123F

*A **uniformly minimum variance unbiased estimator** is an unbiased estimator has the lowest variance of any unbiased estimator regardless of the true value of θ, the estimated parameter.*

★★★★

Definition of exponential family

Extended Linear Model ★★★★

$$f(y;\theta) = \exp\big(a(y)b(\theta) + c(\theta) + d(y)\big)$$

Lesson 43, page 618, formula (43.2) 220B

★★★★

Canonical form of exponential family and natural parameter

221F

Canonical form: $a(y) = y$
Natural parameter: $b(\theta)$

★★★

Examples of members of exponential family

Extended Linear Model ★★★

- *binomial*
- *normal*
- *Poisson*
- *exponential*
- *gamma*
- *inverse Gaussian*
- *negative binomial*
- *compound Poisson/gamma*

★★

$\mathbf{E}[Y]$ *for* Y *exponential in canonical form*

223F

$$\mathbf{E}[Y] = -\frac{c'(\theta)}{b'(\theta)}$$

★★

$\mathrm{Var}(Y)$ *for* Y *exponential in canonical form*

$$\mathrm{Var}(Y) = \frac{b''(\theta)c'(\theta) - c''(\theta)b'(\theta)}{\big(b'(\theta)\big)^3}$$

★★

Definition of Tweedie distribution

Extended Linear Model ★★

$$\operatorname{Var}(Y) = a\,\mathbf{E}[Y]^p$$