W10: FRIDAY

Exam March - 20 - Wednesday

11:30 am - 2:30 pm

Solís 107

(*). ch 2 - EVERYTHING (2.1 - 2.7) - $\boxed{1. Q}$ -

EMPHASIS:

Combinatorics - Example. Ex 2.7.2, 2.7.3. (solved ex...)

Multiplication / Addition rule

Independence - examples 2.5.6, 2.5.12

Conditional probability - examples 2.4.8, 2.4.9. 2.4.12, 2.4.11

Bayes Rule - Examples 2.4.13, - 16

("Calculating unconditional and inverse probabilities").

(*). ch 3 - Random variables - $\boxed{1. Q}$ -

$(\underbrace{3.3,\ 3.4,\ 3.5,\ 3.6},\ 3.7,\ 3.8)$

EMPHASIS:

Computing p.m.f, p.d.f, c.d.f ≡ RELATIONSHIP between pdf & cdf

Computing $\mathbb{E}$ and VAR

$\mathbb{E}$: $\sum_{\text{all } k} k\, \mathbb{P}(X=k)$

$\int_{\text{range of } X} x\, f_X(x)\, dx$

$\text{Var}\, X = \mathbb{E}X^2 - (\mathbb{E}X)^2$

VAR: $\mathbb{E}X^2$: $\sum k^2\, \mathbb{P}(X=k)$

$\int x^2 f_X(x)\, dx$

Transformation of RV — if you know X
Joint densities. how do you find
$\log X$, e^X, X^2, $2X+1$

(*) ch 4 - Specific - Distributions — $\boxed{1\text{-}Q}$ —
(4.1, 4.3, 4.4, 3.2 - Binomial)

Emphasis:
[Modeling issues
Connections between R.V.]
[Central Limit Theorem
Approximations.]

Modeling / Connections:

Binomial = series of n independent trials < True / False
= ~~# of successes~~ in n trials

Geometric = serie of ~~n~~ independent trials < True / False
= # of trials till first sucess

Poisson = # of events that occur per unit time

Exponential = time that passes between two consecutive occurences of Poissonian events.

Normal — almost anything.

Uniform — random inside an interval $\frac{1}{\theta}$ $[0,\theta]$

Chi-squared — $(\text{Normal})^2$

t-distrib. = $\dfrac{\text{Normal}}{\sqrt{\text{chi-squared}}}$

(*) ch 5 - MLE - $\boxed{1 Q}$ —

(5.2, 5.3, 5.4, 5.5)

$\boxed{\text{confidence intervals}}$

Emphasis: DERIVING $\hat{\theta}$ (as A FUNCTION OF X_i's).

[$\cancel{\hat{\theta} = 2}$ $\cancel{\hat{\theta} = 5n-1}$, $\cancel{\hat{\theta} = \infty}$]

Derive distribution of $\hat{\theta}$

$\mathbb{P}(\hat{\theta} \leq a)$ for any aprop. a

$\mathbb{E}\hat{\theta}$

VAR $\hat{\theta}$

$\hat{\theta}$ is function of min X_i max X_i

Comparing 2 estimators - efficiency

CI: need to derive them for different distributions

Exercises:

MLE	CI
5.2.11	5.3.19
5.2.12	5.3.20
all 5.4	
5.5.1	
5.5.4	
5.5.6	

(*) ch 6, 7 — Hypothesis Test — $\boxed{1.Q}$

(6.2, 6.3, 6.4, 7.4, 7.5)

Emphasis: - examples done in lecture

- Derive decision rule (critical region)

$X_1, \dots, X_n$ - f

f - scaled normal $N(\mu+10, \sigma^2)$

$N(\mu, \sigma^2 + 100)$

$H_0: \mu = 0$

$H_1: \mu \neq 0.$

Exercises: 6.3.4, 6.3.7, 6.3.9

6.4.4, $\boxed{6.4.13}$, 6.4.17, 6.4.19

difficult.

- Comparing two tests

Type I error

Type II error

(power)

(*) ch 6, 7 — $\boxed{\text{Hypothesis Test}}$ — $\boxed{1.Q}$

(6.2, 6.3, 6.4, 7.4, 7.5)

Emphasis: - examples done in lecture

- Derive decision rule (critical region)

$X_1, \dots, X_n - f$

f - scaled normal $N(\mu+10, \sigma^2)$

$N(\mu, \sigma^2 + 100)$

$H_0: \mu = 0$

$H_1: \mu \neq 0.$

Exercises: 6.3.4, 6.3.7, 6.3.9

6.4.4, $\boxed{6.4.13}$, 6.4.17, 6.4.19

difficult.

- Comparing two tests — Type I error, Type II error (power)