STA447/2006 01/15/15 (1)

announcements | use pens (not pencils)

1) quiz 1/2 01/22/15 & 03/19/15

$6^{10} - 6^{35}$ pm

class room

no aid (specific calculators) - 2 H/w problems only

2) M/T 02/05/15

$6^{10} - 7^{10}$ (course outline)

SS1085 & SS1087

next door to each other

(discuss size of formula sheet)

3) My talk at

TPS (M) 02/02/15 - 3 days before M/T

2-3 pm Fields

Stewart Lib. (3^{rd} floor)

answering q's @ 3^{pm} - 2^{nd} floor

Comments to solutions of #'s

#46b p.85 (assume indep. of r.v.'s X & Y

#16 p.165 -discuss

37) Intuition versus mathematical theorems

44) Show 2 solutions for the mean & the variance.

Discuss how to find E & Var by scratch, simply by conditioning.

A short-cut approach is to identify r.v. of interest as compound Poisson-uniform with subsequent application of last-week formulas for E & Var of compound Poisson r.v.'s

#53 p. 172 (3)

The classical example of a

Poisson mixture

(which are NOT to be confused with compound Poisson r.v.)

Still, discuss a relationship between these 2 classes of r.v.'s

a Poisson mixture admits a compound Poisson representation, but not vice versa.

Also, a Poisson mixture is integer-valued & non-negative. This is not necessarily the case for a compound Poisson distribution. (relate to MPP's Sec. 5.4.3 p. 332

The resulting law in #53,

$P\{X=n\} = \left(\frac{1}{2}\right)^{n+1}$, $n \geq 0$ is

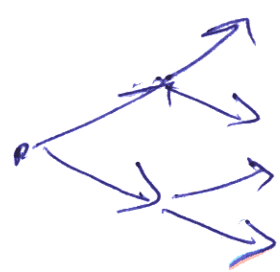
(symmetric) geometric which starts from $\emptyset$ (but not from 1 as in other text-books).

Motivation behind using back-shifting --

Yule process (or pure birth process) of Ch. 5

See Ex. 6.3 (p. 360) & Ex. 6.8 (pp 367-368)

The sum of i.i.d. r.v.'s with common geometric d'n is negative binomial (which starts from $\emptyset$)



etc.

birth epochs - iid exponential r.v.'s (rate $= \lambda$)

5

#53

$P\{X=n\} = \int_0^\infty P\{X=n \mid \lambda\} e^{-\lambda} d\lambda$

law of total probability (continuous form)

$= \int_0^\infty \frac{e^{-\lambda}\lambda^n}{n!} e^{-\lambda} d\lambda$

$= \int_0^\infty e^{-2\lambda} \lambda^n \frac{d\lambda}{n!}$

$= \left(\frac{1}{2}\right)^{n+1} \frac{1}{n!} \int_0^\infty e^{-t} t^n dt$ $\quad t = 2\lambda$

$\int_0^\infty e^{-t} t^n dt = \Gamma(n+1) = n!$

$\Rightarrow P\{X=n\} = \left(\frac{1}{2}\right)^{n+1}$

$n \geq 0$