STAT 280 Sept 19, 2001

More Ch 3 ... More Discrete Probability Models

Assignment: For Wed at class or tutorial.
3.1-10, 3.2-10, 3.3-4, 3.4-4, 3.5-10, 3.6-4

Note typo in first e-mail.

Recall Bernoulli trials Indept sequence of bernoullis:

Binomial: Fix n, X = no of successes where P(Success) = p fixed
e.g. How many winners with 1 ticket in 1000 lotteries? X
X in range 0,1,2,...n

Geometric: Bernoulli trials again. But number of trials is random variable
this time. How many trials til first success? P(success)=p fixed.

See p 111. For X=x, must fail x-1 times and then win.

P(X=x) = p(1-p)**(x-1) x=1,2,3,....

e.g.1 How many lotteries til major prize?

e.g.2 P(fatal accident) = p How many drives?

Hypergeometric:

Recall Binomial application to sampling a large population:
With or without replacement does not matter.
Small population, does matter

Let X be number in random sample of a particular kind, where
sampling is without replacement, from a population of size N.

X is Hypergeometric. p 117

P(X=x) = rCx . (N-r)C(n-x) / NCn x= max(0,n-(N-r)), ... min(n,r)

example: 20 light bulbs - 3 are faulty

sample 5 of them: Let X be number faulty in sample of 5.

P(X=x) = 3Cx . 17C(5-x) / 20C5 x= 0,1,2,3

P(X=1) = 3C1 . 17C4 / 20C5 = 3.(17.16.15.14/24) /(20.19.18.17.16/120)
= .46

Binomial? n=5, p=.15 table p 404 -> .39 for P(X=1)

Consider sample of 20, SD = 0! but for Binomial SD = sqrt (20 *.15*.85)=1.6

Multinomial: sample n things with replacement from pop of k kinds of things.
sample is vector:

20% Green, 50% blue, 30% red. Sample 5 things -> B,G,G,R,B

P(2G,2B,1R) = ? see p 121

Relationship to Binomial. 2 kinds.

Poisson Random Variable: number of instances of something

p 125   X = number of events

P(X=x) = exp(-mu) mu**x/x!

example. Murders in Vancouver: 10 per year

How many in 1 month? average is 10/12 = mu

P(X=0) = exp(-10/12) = .43

P(X=1) = exp (-10/12) (10/12) = .36

P(X=2) = exp (-10/12) (10/12)**2 / 2! = .43 *.15

Relationship to Binomial: p small, n large, approaches Poisson with mu=np