STAT 702/J702

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-Lecture 10-

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Today

- Homework Solutions
- Intro to Continuous Variable Cont.
- Exponential Distribution

Ch. 2 #31a) Phone calls are received at a certain residence as a Poisson process with parameter λ=2 per hour.

If the resident takes a 10-min. shower what is the probability that the phone rings during that time?

Also: Wisconsin has approximately 4,000,000 registered voters, of which 4 percent are undecided for the upcoming election.

a) Briefly, why is it not unreasonable to model a survey of 100 of these voters as a binomial rather than a hypergeometric?

b) In a random sample of 100 registered voters, what is the probability of having no undecided respondents?

c) How many do you expect to have to survey before you have the first undecided respondent?

d) What is the probability that the tenth person you talk to is your second undecided?

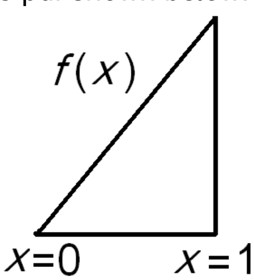
2.2 – Continuous Variables (cont.)

Consider a random number generator that selects a real number at random from between 0 and 1.

$$Var(X) = \sum (x-\mu)^2 p(x)$$

$$\Rightarrow \int_{-\infty}^{+\infty} (x-\mu)^2 f(x)dx$$

Example) Consider the distribution with the pdf shown below:



2.2.1 – Exponential Distribution

Consider a Poisson process with parameter λ

Say we are interested in the random variable:
W=time until the next occurence

Lets look at the problem in terms of the cdf:

$F(w)$
$= P(W \leq w)$
$= 1 - P(W > w)$
$= 1 - P(\text{no changes in } [0, w])$
$=$

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We can then find the:

pdf

mean

variance

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Now back to our earlier example…

Between 2am and 4am cars pass the mile marker at a rate of 24 per hour.

How long until the next car passes?

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2.2.2-The Gamma Distribution

$$g(t) = \frac{\lambda^{\alpha}}{\Gamma(\alpha)} t^{\alpha-1} e^{-\lambda t} \text{ for } t \geq 0$$