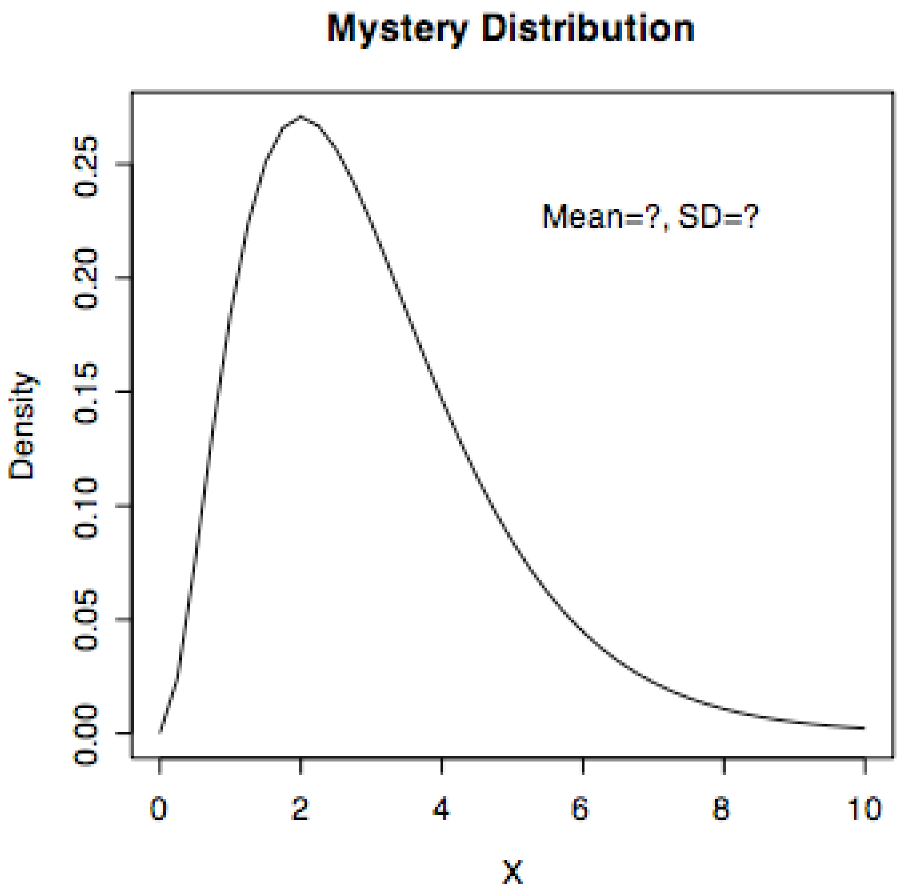
STAT 270 Quiz (and Assignment #4) Feb. 9, 2007

Q1. What is the shortcoming of a histogram for summarizing a time series?

A1. Order of observations is lost.

Q2. i) Guess the Mean, Standard Deviation, and Interquartile Range, of the random variable described by the following Density Function (Within 0.5).

ii) Draw a freehand graph of the cdf corresponding to the pdf below. Include axis labels and scales (but neatness and precision are not important).



A. i) Mean is 3, SD is $3^{1/2} = 1.73$, and IQR is 3.92-1.72=2.20

ii) the usual S curve like the cdf graph on p 152. The x scale is the same as the density and the y scale goes from 0 to 1.

Q3: Why does the binomial probability formula for P(X=x) have the combinatorial coefficient $\binom{n}{x}$ in it? (Note $\binom{n}{x}$ is the same as $C_{x,n}$)

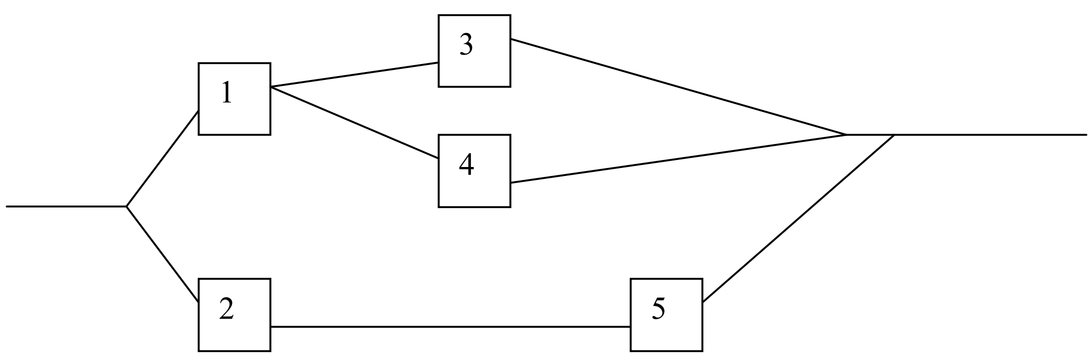
A3: $\binom{n}{x}$ is the number of ways to select the positions of the x successes in the n sequence of Ss and Fs. Each such sequence has the same probability (given by the rest of the formula) so this count gives the total probability for x Ss to occur.

Q4: Which distribution models the following random variables? Specify parameters when known or guess them otherwise.

i) X=the number of containers with broken eggs in a shipment of 144 containers.
ii) Y= the selection of a random digit from a random number table.
iii) Z= the weight of fat in a 100 gm hamburger sold by a fast-food outlet

A4: i) Bin (n=144, p=.07)
ii) Uniform on 0,1,...,9
iii) Normal (mean = 30, SD=3)

Q5. In the network, each component transmits current independently, with probability p. What is the probability that the system transmits current? Evaluate for p=0.5.



A5. P(system works)=P(134 or 25)=P([1 and (3 or 4)] or (2 and 5)])=

$$p(2p-p^2)+p^2-p^3(2p-p^2) =$$
$$p^5-2p^4-p^3+3p^2$$

Check if p=0 its 0, if p=1 it is 1+1-1=1. If p=.5 it is 3/8 + ¼ -3/32 = 17/32.

Some questions I did not use .....

Q: At a wedding reception, 7 people are to stand side-by-side for a photograph. The bride and groom insist on standing beside each other, as do the bride's mother and father, but the other three people have no such preferences. How many ways are there to arrange (order) the 7 individuals in line for the photo?

A: Treating the couples temporarily as one person, there would be 5! orders. But for each of these there are four options depending on the two couple's positions. So the number of ways is 4*5! = 500.

Q: An automobile agency has sales experience which suggests that the 6 models sold at this agency have the following shares of the total sales:

Model	A1	A2	B	C1	C2	C3
Share(%)	10	10	30	20	10	10

i) A customer wishes to examine models A1,A2, and B, but is not interested in C1,C2, or C3. What is the probability that, if the customer buys a car, it will be model B?

ii) What is the chance that the next two customers choose models C1 and C2, respectively? Make an appropriate assumption to allow this calculation.

A: i) 30/50 = .6
ii) .1 * .1 =.01 assuming independent choices.