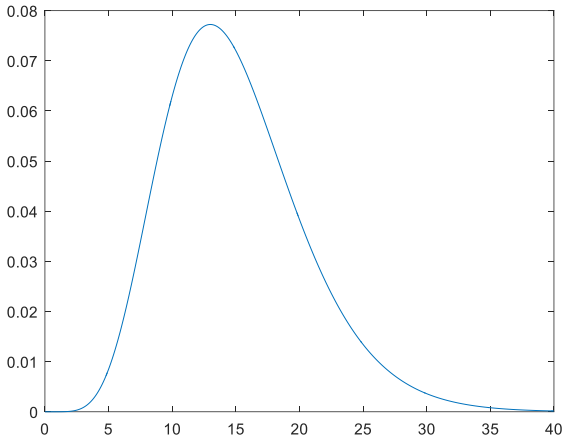
IT3030 Biostatistics Quiz#7 2019.06.04 ID:_____ Name:_____

【Show your MATLAB commands in getting these answers.】

1. (40%) Considering we are performing a χ^2 test for a contingency table of size 6 by 4. (a) What is the degree of freedom (DF) for the correct χ^2 probability density function to use? (b) Graph this PDF by setting the x-axis from 0 to 40. (c) Determine the x value that cuts off the right-end tail having area of 0.05. (d) Determine the size of the right-end tail for x=30.

Answer:
(a) DF = (r-1)*(c-1) = (6-1)*(4-1) = 5*3 = 15.
(c)
>> chi2inv(0.95,15)
ans = 24.9958
>>
(d)
>> 1-chi2cdf(30,15)
ans = 0.0119
>>



2. (60%) Given the numbers of head injury versus wearing helmet or not at the time of accident in the table below. We'd like to know whether there is an association between wearing helmet and head injury using χ^2 test. (Take α=0.05 for the test.) (a) (40%) Build the expected contingency table. (b) (10%) Compute the χ^2 value. (c) (10%) Compute the p-value to determine whether there exists difference between the table tables or not.

Head injury	Wearing helmet	
	No	Yes
Yes	43	21
No	90	89

Ans:
>> O1=43;O2=21;O3=90;O4=89;
>> E1=133*64/243 = 35.0288
>> E2=110*64/243 = 28.9712
>> E3=133*179/243 = 97.9712
>> E4=110*179/243 = 81.0288
The expected contingency table is:

35.0288	28.9712	43+21=64
97.9712	81.0288	90+89=179
43+90=133	21+89=110	64+179=243

>> O=[O1 O2 O3 O4]; E=[E1 E2 E3 E4];
>> chi2=sum((O-E).^2./E) = 5.4399
>> 1-chi2cdf(chi2,1) = 0.0197
This p-value is smaller than 0.05, we will reject the null hypothesis that there is no difference between these two tables. That is, strong correlation exists between head injury and wearing helmet.