MAT2001 – Statistics for Engineers - ELA (R Code Studio), Winter Semester 2020-2021

Lab Assessment - V

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Write R code to solve the following problems:

Q1) When a random Variable takes the values of 0,1,2,3,4,5 and 6, the observed frequencies are 109,53,131,12,35,21, and 12. Fit a Poisson Distribution to the above data and test the goodness of fit.

A: Code is as follows:

```
#Q5

x = c(0,1,2,3,4,5,6)

f = c(109,53,131,12,35,21,12)

N = sum(f)

fx = sum(f*x)

mean = fx/N

lambda = mean

#Finding Probability Function P(X) from 0 to 6

p0 = dpois(0,lambda)

p1 = dpois(1,lambda)

p2 = dpois(2,lambda)

p3 = dpois(3,lambda)

p4 = dpois(4,lambda)

p5 = dpois(5,lambda)

p6 = dpois(6,lambda)

P = c(p0,p1,p2,p3,p4,p5,p6)

P

E = c(P*N)

E1 = c((f-E)^2/E)

E1

X2 = sum(E1)
```

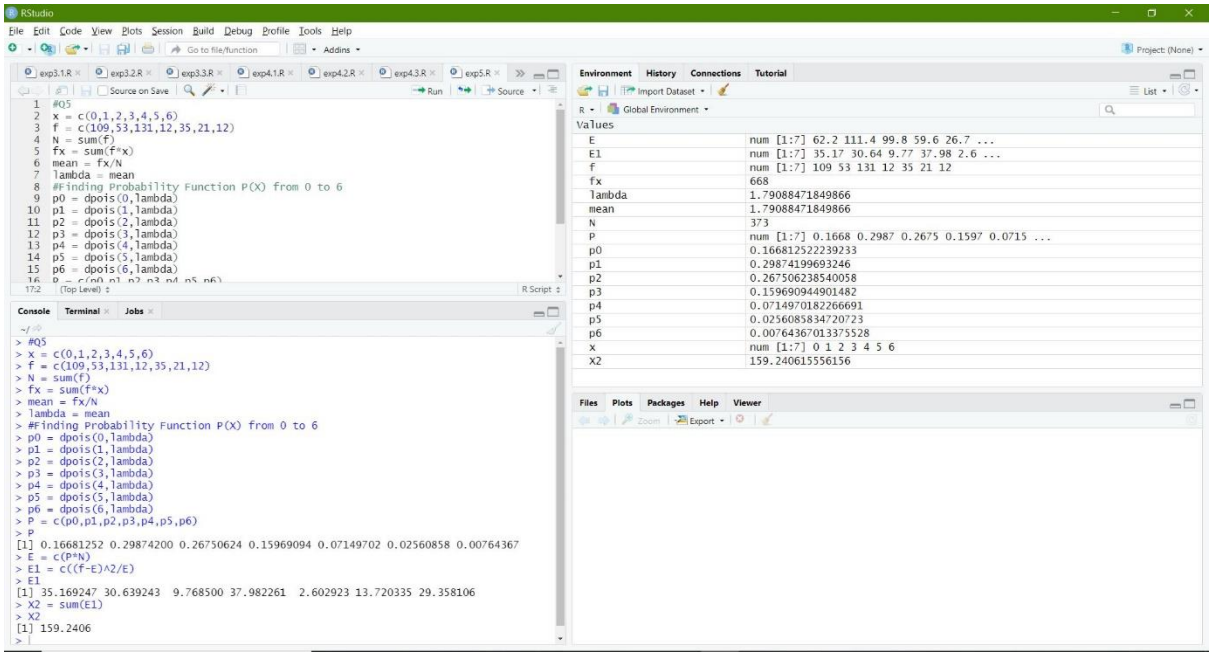
X2

Output (via Command Window):

```
> #Q5
> x = c(0,1,2,3,4,5,6)
> f = c(109,53,131,12,35,21,12)
> N = sum(f)
> fx = sum(f*x)
> mean = fx/N
> lambda = mean
> #Finding Probability Function P(X) from 0 to 6
> p0 = dpois(0,lambda)
> p1 = dpois(1,lambda)
> p2 = dpois(2,lambda)
> p3 = dpois(3,lambda)
> p4 = dpois(4,lambda)
> p5 = dpois(5,lambda)
> p6 = dpois(6,lambda)
> P = c(p0,p1,p2,p3,p4,p5,p6)
> P
[1] 0.16681252 0.29874200 0.26750624 0.15969094 0.07149702 0.02560858 0.00764367
> E = c(P*N)
> E1 = c((f-E)^2/E)
> E1
[1] 35.169247 30.639243  9.768500 37.982261  2.602923 13.720335 29.358106
> X2 = sum(E1)
> X2
[1] 159.2406
```

Therefore, Goodness of Fit = Chi^2 = 159.2406

Implementation on R Studio Code (via Command Window):


RStudio
File Edit Code View Plots Session Build Debug Profile Tools Help
exp3.1.R exp3.2.R exp3.3.R exp4.1.R exp4.2.R exp4.3.R exp5.R
Source on Save Run Source
1 #Q5
2 x = c(0,1,2,3,4,5,6)
3 f = c(109,53,131,12,35,21,12)
4 N = sum(f)
5 fx = sum(f*x)
6 mean = fx/N
7 lambda = mean
8 #Finding Probability Function P(X) from 0 to 6
9 p0 = dpois(0,lambda)
10 p1 = dpois(1,lambda)
11 p2 = dpois(2,lambda)
12 p3 = dpois(3,lambda)
13 p4 = dpois(4,lambda)
14 p5 = dpois(5,lambda)
15 p6 = dpois(6,lambda)
17:2 (Top Level) R Script
Console Terminal Jobs
> #Q5
> x = c(0,1,2,3,4,5,6)
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> fx = sum(f*x)
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> P = c(p0,p1,p2,p3,p4,p5,p6)
> P
[1] 0.16681252 0.29874200 0.26750624 0.15969094 0.07149702 0.02560858 0.00764367
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[1] 35.169247 30.639243 9.768500 37.982261 2.602923 13.720335 29.358106
> X2 = sum(E1)
> X2
[1] 159.2406
Environment History Connections Tutorial
Import Dataset List
R Global Environment
Values
E num [1:7] 62.2 111.4 99.8 59.6 26.7 ...
E1 num [1:7] 35.17 30.64 9.77 37.98 2.6 ...
f num [1:7] 109 53 131 12 35 21 12
fx 668
lambda 1.79088471849866
mean 1.79088471849866
N 373
P num [1:7] 0.1668 0.2987 0.2675 0.1597 0.0715 ...
p0 0.166812522239233
p1 0.29874199693246
p2 0.267506238540058
p3 0.159690944901482
p4 0.0714970182266691
p5 0.0256085834720723
p6 0.00764367013375528
x num [1:7] 0 1 2 3 4 5 6
X2 159.240615556156
Files Plots Packages Help Viewer
Zoom Export