MA381

Julia Nelson Homework 5 October 20, 2019

"I pledge my honor that I have abided by the Stevens Honor System" Julia Nelson

Problem 9.37

Stratum	Sampled Claims	# Not allowed
Small	57	6
Medium	17	5
Large	5	1

(a) Small 57-6=51
Med 17-5=12
Larg 5-1=4

Frequencies (observed counts)

Claims:

Stratum	# Allowed	#Not Allowed	Total
Small	51	6	57
Medium	12	5	17
Large	4	1	5
Total	67	12	79

(b) Small:
$6/57 = 0.10526$
$= 10.53\%$ small claims not allowed

Med:
$5/17 = 0.294118$
$= 29.41\%$ medium claims not allowed

Large
$1/5 = 0.20$
$= 20\%$ large claims not allowed

(c) Combine Med + Large to get

Stratum	# Allowed	#Not	Total
Small	51	6	57
Med/ Large	16	6	22
Total	67	12	79

We do this because the # Not allowed for Large is < 5 so we must combine to perform a significance test

(d) H_0: There is no connection b/w Stratum Size and # Allowed ~~or Not~~

H_α: The IS a connection b/w Stratum Size, and # Allowed

(e)

expected =

	Allowed	Not
small	$\frac{67\times57}{79} = 48.34177215$	$\frac{12\times57}{79} = 8.658227848$
Med + Large	$\frac{67\times22}{79} = 18.65822785$	$\frac{12\times22}{79} = 3.341772152$

$$X^2 = \frac{(57-48.34177215)^2}{48.34177215} + \frac{(6-8.658227848)^2}{8.658227848} + \frac{(16-18.65822785)^2}{18.65822785} + \frac{(6-3.341772152)^2}{3.341772152}$$

$$\Rightarrow 0.146171209 + 0.816122584 + 0.378716354 + 2.114499424$$

$$= 3.455509534$$

Test Stat: $X^2 = 3.45551$

$df = (2-1)(2-1) = 1$ → $P(\chi^2 > X^2) \Rightarrow P(\chi^2 > 3.45551)$

$= 0.0630$

Fail to Reject H_0

Problem 9.38

(a) small

$$342 \times \left(\frac{6}{57}\right) = 351.7894737 = 351.79$$

Med

$$246 \times \left(\frac{5}{17}\right) = 72.35294118 = 72.353$$

Large

$$58 \times \left(\frac{1}{5}\right) = 11.6$$

(b)

95% conf → $z^* = 1.96$

Marg of error

small $E = 1.96\left(\sqrt{\frac{(6/57)(1-(6/57))}{57}}\right) = 0.07967$

Med $E = 1.96\left(\sqrt{\frac{(5/17)(1-(5/17))}{17}}\right) = 0.216599 = 0.2166$

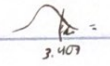
Large $E = 1.96\left(\sqrt{\frac{(1/5)(1-(1/5))}{5}}\right) = 0.350615 = 0.3506$

Problem 9.50

Categories	Sample → 500 counts:	From Table A:	E Expected
① $X \leq -0.6$	139	0.27425	→ ×500 = 137.12656
② $X > -0.6$ & $X \leq -0.1$	102	0.18592	→ ×500 = 92.9595
③ $X > -0.1$ & $X \leq 0.1$	41	0.07966	→ ×500 = 39.82784
④ $X > 0.1$ & $X \leq 0.6$	78	0.18592	→ ×500 = 92.9595
⑤ $X > 0.6$	140	0.27425	→ ×500 = 137.12656

Categories	x^2
①	$(139 - 137.12656)^2 / (137.12656) = 0.025595168 7$
②	$(102 - 92.95952)^2 / (92.95952) = 0.879202889 9$
③	$(41 - 39.82784)^2 / (39.82784) = 0.034497453 7$
④	$(78 - 92.95952)^2 / (92.95952) = 2.407362244$
⑤	$(140 - 137.12656)^2 / (137.12656) = 0.060211949$
$\Sigma \Rightarrow$	3.406869705

$df \Rightarrow 5 - 1 = \boxed{4}$ $\quad \boxed{= 3.407}$

$P(x^2 \geq 3.407)$ 

$0.9997/2 = 0.49985$

$0.49985 > \alpha = 0.05 \Rightarrow$ Not Good Fit

	Counts	Table A:		Expected
①	$(X \leq -0.7)$	102	0.24355	×500 = 121.775
②	$(-0.7 < X \leq -0.3)$	96	0.14045	×500 = 70.225
③	$(-0.3 < X \leq 0.3)$	106	0.23232	×500 = 116
④	$(0.3 < X \leq 0.7)$	92	0.14045	×500 = 70.225
⑤	$(0.7 < X)$	104	0.24355	×500 = 121.775

$\Sigma = (3.2113 + 9.46032 + 0.862206 + 6.75188 + 2.5945)$

$= 22.880061 55$

Not a good sample $\quad df = 5 - 1 = 4$

$P(X^2 \geq 22.88)$ $\quad P > 0.05$ Not a good fit.