

*Pledge: I pledge my honor that I have abided by the Stevens Honor System. -Eric Altenburg*

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(a)

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

From this table we can see that each claim, be it small, medium, or large, can either be allowed or not allowed after auditing. In this case, after sampling 79 claims, 67 were allowed while 12 were not.

(b)

Small:  $\frac{6}{57} = 0.105 = 10.5\%$

Medium:  $\frac{5}{17} = 0.294 = 29.4\%$

Large:  $\frac{1}{5} = 0.20 = 20\%$

(c)

Stratum	Numbers Allowed	Numbers Not Allowed	Sampled Total
Small	51	6	57
Medium and Large	16	6	22
Total	67	12	79

The reason for the medium and large strata being combined is due to the large's "Numbers Not Allowed" being too small.

(d)

$H_0$  : There is no association among the claim size and whether the claim will be allowed.

(e)

Expected Counts

	Numbers Allowed	Numbers Not Allowed
Small	48.34	8.66
Medium and Large	18.66	3.34

$df = 1$

$$\chi^2 = \sum \frac{(\text{Observed} - \text{Expected})^2}{\text{Expected}} = 3.46$$

$p\text{-value} = 0.063$

Since the p-value is greater than the significance level of 0.05, we accept the null hypothesis stating that there is no association among the claim size and whether the claim will be allowed.

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Small:

$$\frac{6}{57} = 0.105$$

$$0.105 * 3342 = 351.79 \approx 350 \text{ Not Allowed}$$

Medium:

$$\frac{5}{17} = 0.294$$

$$0.294 * 246 = 72.35 \approx 72 \text{ Not Allowed}$$

Large:

$$\frac{1}{5} = 0.2$$

$$0.2 * 58 = 11.6 \approx 11 \text{ Not Allowed}$$

**(b)**

$$SE = \sqrt{\frac{p(1-p)}{n}} \quad SE_{Small} = \sqrt{\frac{0.105 * 0.895}{57}} = 0.0406$$

$$SE_{Medium} = \sqrt{\frac{0.294 * 0.706}{17}} = 0.1104$$

$$SE_{Large} = \sqrt{\frac{0.2 * 0.8}{5}} = 0.179$$

For 95% CI,  $z = 1.96$ .

$$Small = 1.96 * 0.0406 = 0.08$$

$$Medium = 1.96 * 0.1104 = 0.217$$

$$Large = 1.96 * 0.179 = 0.35$$

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Groups	Count	Probability	Expected Count
$x \leq -0.6$	139	0.2743	137.15
$-0.6 < x \leq -0.1$	102	0.1859	92.95
$-0.1 < x \leq 0.1$	41	0.0796	39.8
$0.1 < x \leq 0.6$	78	0.1859	92.95
$x > 0.6$	140	0.2743	137.15

$$df = 4$$

$$\chi^2 = 3.406$$

$$p\text{-value} = 0.4923$$

From this, we conclude that the p-value is greater than the significance level of 0.05 which results in the failure to reject the null hypothesis which means the distribution is normal.

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Group	Count	Probability	Expected Count
$x \leq -0.7$	112	0.2420	121
$-0.7 < x \leq -0.2$	82	0.1787	89.35
$-0.2 < x \leq 0.2$	77	0.1586	79.3
$0.2 < x \leq 0.7$	111	0.1787	89.35
$x > 0.7$	118	0.2420	121

$$df = 4$$

$$\chi^2 = 6.661$$

$$p\text{-value} = 0.1549$$

From this, we conclude that the p-value is greater than the significance level of 0.05 which results in the failure to reject the null hypothesis which means the distribution is normal.