Introduction to Statistics and Probability

Chi-Square Test :

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Chi-Square Test of Association

Expected Value for a Cell

$$= \frac{\text{Column Total} \times \text{Row Total}}{\text{Overall Total}}$$

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- Compute the expected values for each cell in the following table.
- One of the expected values (both A and Y) is given.

	Cat X	Cat Y	Cat Z	Total
Cat A		60		200
Cat B				400
Total	150	180	270	**600**

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Cell$_{(1,1)}$

	Cat X	Cat Y	Cat Z	Total
Cat A	...	60		200
Cat B				400
Total	150	180	270	**600**

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Cell$_{(1,1)}$

- Row 1 : Row Total = 200
- Column 1 : Column Total = 150
- Overall Total = 600

Expected value for Cell$_{(1,1)}$

$$E_{(1,1)} = \frac{200 \times 150}{600} = \frac{30,000}{600} = 50$$

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Expected values for all of the other cells can be computed the same way.

	Cat X	Cat Y	Cat Z	Total
Cat A	50	60		200
Cat B				400
Total	150	180	270	**600**

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Cell$_{(2,1)}$

- Row 2 : Row Total = 400
- Column 1 : Column Total = 150
- Overall Total = 600

Expected value for Cell$_{(2,1)}$

$$E_{(2,1)} = frac400 \times 150600 = \frac{60,000}{600} = 100$$

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	Cat X	Cat Y	Cat Z	Total
Cat A	50	60		200
Cat B	100			400
Total	150	180	270	**600**

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	Cat X	Cat Y	Cat Z	Total
Cat A	50	60	90	200
Cat B	100	120	180	400
Total	150	180	270	**600**

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