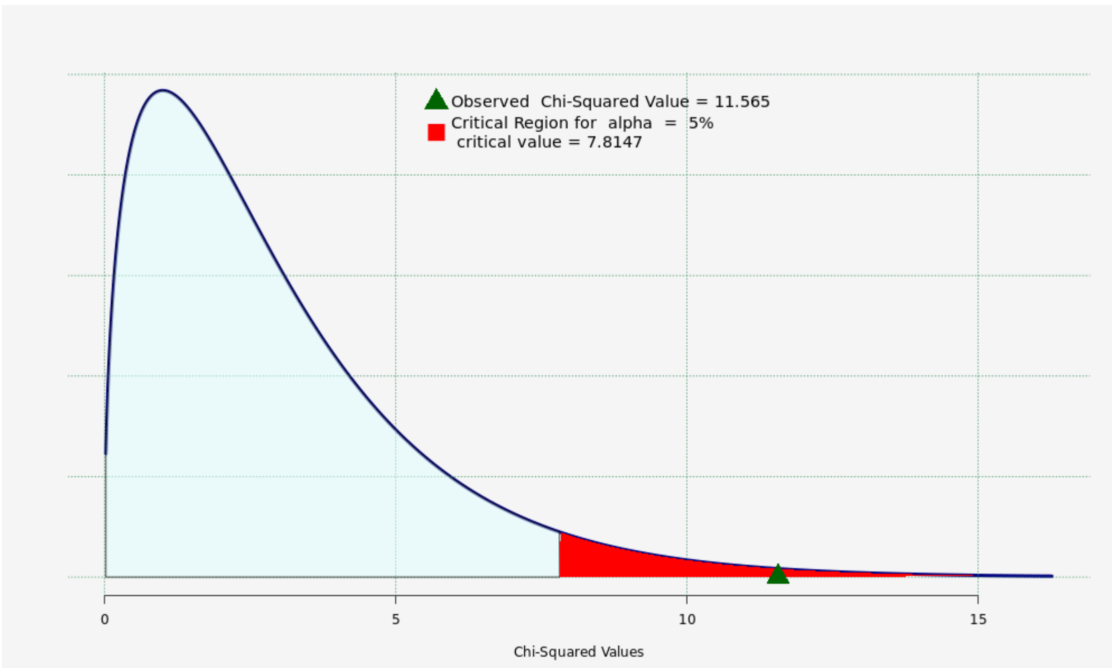
1 Perform a Goodness-of-Fit test and see if the data supports that the personality roles are not randomly assigned.

Personality Role	Observed Count	Expected Count	Observed Count	Expected Proportion
Analysts	35	23	0.38043	0.25
Diplomats	26	23	0.28261	0.25
Explorers	16	23	0.17391	0.25
Sentinels	15	23	0.16304	0.25

H_0 : The distribution of personalities are equal
H_a : The distribution of personalities are not equal

$$df = 3$$

$$\chi^2 = \sum \frac{(Observed - Expected)^2}{Expected} = 11.5652$$



Conclusion: Because our χ^2 value is greater than the critical value at a 5% significance level, we reject the null hypothesis the that the distribution of personality types are equal and accept the alternative that concludes that personalities are not randomly assigned

2 Test if the personality role and one of the other categorical variables (your choice: College) are independent.

Observed

College	Analysts	Diplomats	Explorers	Sentinels	**Total**
College X	1	1	0	0	2
College Y	1	0	0	0	1
College Z	0	1	0	0	1
Engineering and Computer Science	22	14	12	10	58
Natural Sciences and Mathematics	11	10	4	5	30
Total	**35**	**26**	**16**	**15**	**92**

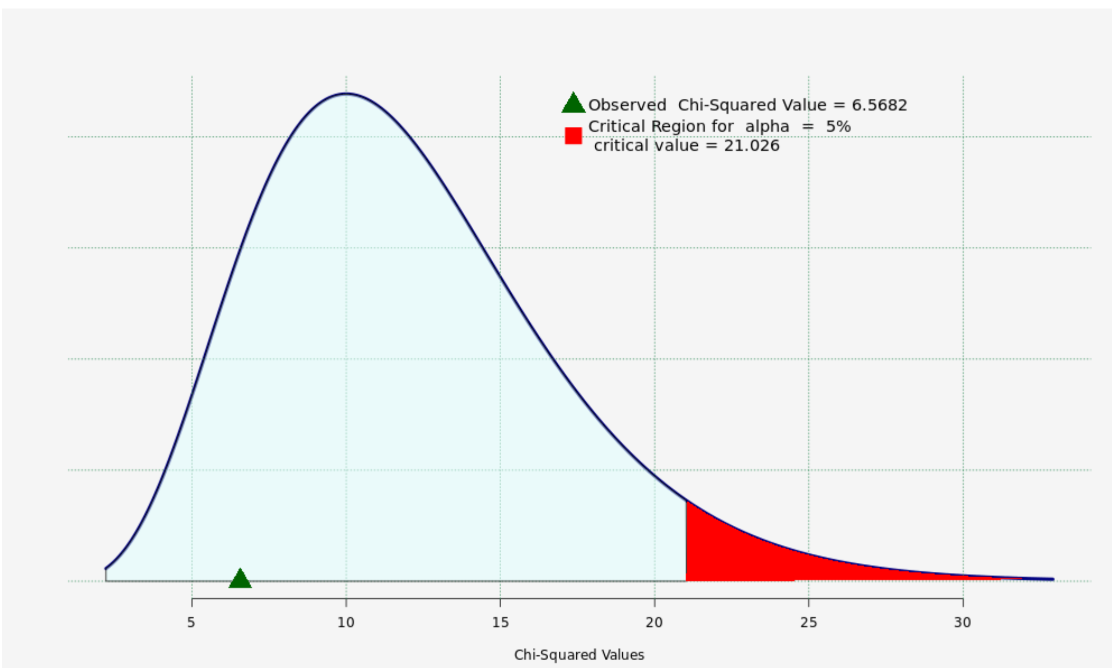
Expected

College	Analysts	Diplomats	Explorers	Sentinels	**Total**
College X	0.76	0.57	0.35	0.33	2
College Y	0.38	0.28	0.17	0.16	1
College Z	0.38	0.28	0.17	0.16	1
Engineering and Computer Science	22.07	16.39	10.09	9.46	58
Natural Sciences and Mathematics	11.41	8.48	5.22	4.89	30
Total	**35**	**26**	**16**	**15**	**92**

H_0 : Personality type and College are independent
H_a : Personality type and College are not independent

$$df = (Rows - 1)(Columns - 1) = (5 - 1)(4 - 1) = 12$$

$$\chi^2 = \sum \frac{(Observed - Expected)^2}{Expected} = 6.5682$$



Conclusion: Because our χ^2 value is less than our critical value at a 5% significance level, we fail to reject the null hypothesis and we can conclude that personality type and college are independent.