

CHI-SQUARE GOODNESS OF FIT TEST

This test is used to determine if observed counts are equal to a hypothesized distribution.

A researcher believes the Mars Company is misleading the public on its color distribution of M&Ms. He wants to compare the color distribution from a random sample of M&Ms to the Mars Company's expected values:

	Brown	Red	Yellow	Green	Orange	Blue	Purple
Sample	4	4	16	10	8	4	4
Expected	.10 (5)	.20 (10)	.20 (10)	.10 (5)	.10 (5)	.10 (5)	.20 (10)

H STATE NULL AND ALTERNATIVE HYPOTHESES:

H₀: Color distribution of M&Ms is the same as the company claims

H_a: Color distribution of M&Ms is different than the company claims

A DETERMINE THAT CONDITIONS FOR TEST ARE ACCEPTABLE:

- Counts (not percents)- yes
- Every expected count ≥ 1 and 80% ≥ 5 - yes

T PERFORM TEST:

a) Calculate Chi-Square statistic:

$$X^2 = \sum (O_i - E_i)^2 / E_i = (4 - 5)^2 / 5 + \dots + (4 - 10)^2 / 10 = 18.0$$

b) Determine Degrees of Freedom = Number of Categories - 1 = 7 - 1 = 6

c) Determine P-Value

i) Using Table:

P-value $< .01$ for X^2 of 18 and degrees of freedom 6

ii) Using calculator:

DISTR \rightarrow 7: X^2 cdf (18, 100, 6) \rightarrow $p = .006$

S STATE CONCLUSION IN CONTEXT

There is very good evidence to reject H_0 ($p = .006$) and conclude that the color distribution of M&Ms is **not** what the company claims it should be.