The Goodness-of-Fit Test

Lecture 49
Section 14.3

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Outline

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Goodness-of-Fit Test on the TI-83

- Be careful when using the TI-83!
- There is a function called χ^2`-Test`, but it does *not* perform the goodness-of-fit test.
- Some TI-84s have a `GOF-Test` function.
- The `GOF-Test` function does perform the goodness-of-fit test.

Goodness-of-Fit Test on the TI-83

TI-83 Goodness-of-fit test

- Put the observed counts in list $\texttt{L}_1$.
- Put the hypothetical proportions in list $\texttt{L}_2$.
- Multiply $\texttt{L}_2$ by the sample size and store as $\texttt{L}_2$. These are the expected counts.
- Calculate $(\texttt{L}_1-\texttt{L}_2)^2/\texttt{L}_2$ (either all at once or step by step).
- Go to `LIST > MATH` and select `sum` (item #5).
- Enter `Ans` and press `ENTER`. The value of χ^2 appears.
- Then use χ^2`cdf` to find the *p*-value.

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- That is, what if we had observed

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- Would it be signficant?

Outline

Example - Fairness of a Coin

Example (TI-83 Goodness-of-fit test)

- Suppose we toss a coin 1000 times and get 525 heads and 475 tails.
- Does this indicate that is fair or that it is biased?

Example - Fairness of a Coins

Example (TI-83 Goodness-of-fit test)

(1) Let $p_1 =$ proportion of heads.
Let $p_2 =$ proportion of tails.
$H_0 : p_1 = 0.50, p_2 = 0.50$
$H_1 : H_0$ is not true.

(2) $\alpha = 0.05$.

(3) The test statistic is

$$\chi^2 = \sum_{\text{all cells}} \frac{(O-E)^2}{E}.$$

Example - Fairness of a Coin

Example (TI-83 Goodness-of-fit test)

(4) We have the table

	Heads	Tails
Observed	525	475
(Expected)	(500)	(500)

Calculate

$$\chi^2 = \frac{(525-500)^2}{500} + \frac{(475-500)^2}{500}$$
$$= \frac{625}{500} + \frac{625}{500}$$
$$= 1.25 + 1.25$$
$$= 2.5.$$

Example - Fairness of a Coin

Example (TI-83 Goodness-of-fit test)

(5) The p-value is

$$p\text{-value} = \chi^2\texttt{cdf(2.5,E99,1)} = 0.1138.$$

(6) Accept H_0.

(7) The proportion of heads is 50%.

Example - Fairness of a Coin

- Perform the above test as a two-tailed one-proportion z test.
- That is, let the alternative hypothesis be

$$H_1 : p_1 \neq p_2.$$

- What is the p-value?
- What is the value of the test statistic z?
- Square that number. What do you get?

Outline

Assignment

Homework

- Read Sections 14.1 - 14.3, pages 921 - 935.
- Let's Do It! 14.2, 14.3.
- Exercises 6 - 11, 14, 15, page 935.