

Lesson Plan

(The Binomial Distribution and Hypothesis Testing)
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Objectives: Students will be able to

1. Use the TI-83 calculator to model a binomial experiment
2. find the rejection region of a binomial experiment
3. State the null and alternative hypothesis of the experiment
4. design and conduct a binomial experiment

Definitions:

Experiment
Success
Retention Region
Rejection Region
Alpha Level
P-value
Null Hypothesis
Alternative Hypothesis

Procedure:

A discussion of the binomial probability distribution will be led by the teacher. Examples will be given of experiments that are modeled by the binomial distribution. Then the class will be shown how to use the binomial distribution to generate probabilities for a binomial experiment.

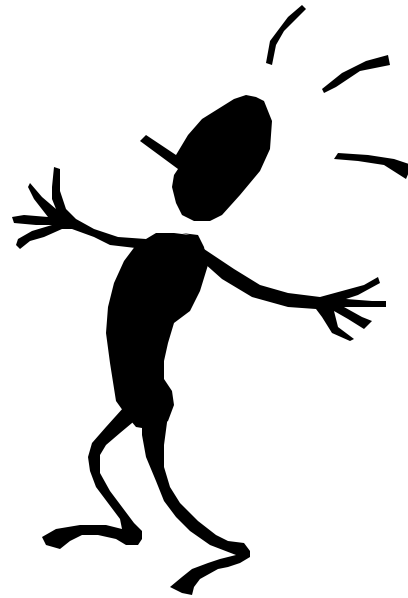
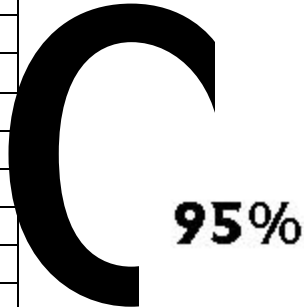
Using "A Little Handout for You" as a guide, the class will design an experiment to determine whether or not a coin is fair. The alpha level will be set at 0.05.

Assignments:

1. *The Power of the Experiment* (The purpose is to show the importance of large samples)
2. *Little Man*

A little handout for You

x	$P(x)$
0	.000008
1	.000130
2	.001038
3	.005188
4	.018158
5	.047211
6	.094421
7	.148376
8	.185471
9	.185471
10	.148376
11	.094421
12	.047211
13	.018158
14	.005188
15	.001038
16	.000130
17	.000008



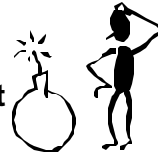
The above is the pdf of the experiment in which a coin is flipped 17 times, where getting a tail is a success.

Summary

Reasoning regarding testing H_0 .

- 1) Using a mathematical model we look at how the experiment would turn out if only chance was at work.
- 2) Explicitly state H_0 and the research hypothesis.
- 3) Perform the experiment and record the result.
- 4) Compare the obtained result with the kind of outcomes that are typical where nothing but chance is causing the outcome of the experiment.
- 5) If the obtained outcome is not typical of the work of chance then we conclude that chance did not cause the obtained outcome, we reject H_0 .
- 6) If the obtained outcome of the experiment resembles chance produced outcomes, then we conclude that perhaps chance produced our result, although we cannot be sure that only chance was at work.

Power of Experiment



1. Design an experiment to determine if a coin is fair. Use 4 trials.

a. What is the retention region?

b. What is the rejection region?

2. Design an experiment to determine if a coin is fair. Use 8 trials.

a. What is the retention region?

b. What is the rejection region?

Little Man Assignment

I. John Knowall claims that he can recognize the difference between Coka Cola, and Pepsi Cola. In order to test this, we bring him to a soda shop in which 13 samples are given to Mr. Knowall. Each sample consists of a small cup of Coke and a small cup of Pepsi. For each sample, Mr. Knowall is asked to identify the Coke.

- State the null hypothesis
- State the alternative hypothesis
- Find and state the rejection regions
- State the retention region
- Assume that the experiment has been done and that the outcome exists in the rejection region. Give a statistical interpretation
- Assume that the outcome fell within the retention region. Give a statistical interpretation.

After addressing a – f discuss the following:

- He correctly identifies Coke 10 times and makes 3 mistakes.
- He correctly identifies Coke 9 times and makes 4 mistakes.
- He correctly identifies Coke 1 time, making 12 mistakes.

II. Suppose that you are a psychiatrist. One day into your office walks a fast food technician named Homer Clearview. Mr. Clearview claims that he has psychic abilities. Design an experiment involving three playing cards that would test this claim.



- Discuss your design.
- State the null hypothesis
- State the alternative hypothesis
- Find and state the rejection regions
- State the retention region

