Jan. 24 Statistic for the day:
% of the world's population estimated to be drunk at any one time: 0.7%

Assignment: Read Chapter 4
Exercises: pp. 73-77 #1, 4, 5, 7, 9, 17

The second inaugural of George W. Bush, Jan. 20:
Do you think the festivities surrounding today's inauguration were appropriate or inappropriate?

Gallup Poll

Appropriate	Inappropriate	No opinion
60%	32%	8%

From Gallup website: "Despite some controversy this past week over whether it was appropriate to have such a gala while the country is at war, 60% of Americans said the festivities were appropriate; 32% disagreed."

Do you think the result would have been the same if the war had been mentioned in the question?

A perplexing polling paradox

- People generally believe the results of polls.
- People do not believe in the scientific principles on which polls are based

According to Gallup, most Americans said that a survey of 1500 to 2000 respondents (a larger-than-average sample size for national polls) CANNOT represent the views of all Americans.

How are Gallup Opinion Polls Taken?

- Telephone interviews: Random digit dialing
- At random pick
  - Exchange (area code + first three digits; e.g., 814 865)
  - Next two digits (e.g., 22)
  - Last two digits (e.g., 11)
- Up to three callbacks (why callbacks?)
- Evenings and weekends
- This catches unlisted numbers

Designed to be a random sample from the POPULATION of people with telephones.

All members of the population are equally likely to be in the sample.

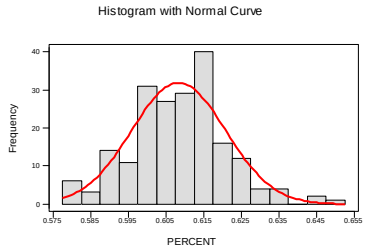
Called a SIMPLE RANDOM SAMPLE.

Polls typically take roughly 1500 or 1600 people.

Repeated sampling produces a HISTOGRAM for the percentage of people in the sample who believed the inaugural festivities were appropriate.

Recall that the percentage for the Gallup poll was 60% (or .60 as a decimal).

WHAT MIGHT THE HISTOGRAM LOOK LIKE?
(Let's suppose the sample contained 1600 likely voters.)



Mean = ??? (We don't know truth)
Standard deviation = (.635-.585)/4 = .0125
200 percentages

We define the MARGIN OF ERROR to be two standard deviations.

Report:
Percentage ± 2 standard deviations

So the margin of error is 2 standard deviations.

In our example:
Standard deviation = .0125 or 1.25%
2 standard deviations = .0250 or 2.5%

Report:
60% ± 2.5% or .60 ± .025

We generally will NOT have the benefit of a histogram to get the standard deviation or the margin of error of the sample percentage.

SECRET FORMULA FOR THE MARGIN OF ERROR OF A SAMPLE PERCENTAGE:

$$\frac{1}{\text{Square root of sample size}}$$

So in our example, if the sample size were 1600, then the square root is 40 and so the MARGIN OF ERROR is:

1/40 = 0.025

Or 2.5 %

And we report 60% ± 2.5%

The 2.5% margin of error is a measure of the uncertainty in our estimate of 60% .

The estimate of 60% is a guess at the population percent. It's based on a sample of 1600 from a huge population.

It would be better to say that our best guess of The population percentage who say yes is

57.5% to 62.5%

Summary:

- We have a simple random sample from the population of telephone owners.
- We find the percentage from our sample.
- The MARGIN OF ERROR is 1 divided by the square root of the sample size.
- For 1600 the MARGIN OF ERROR is .025.
  - Hence we report: PERCENTAGE ± .025
- The margin of error does not depend on the population size, only on the sample size!

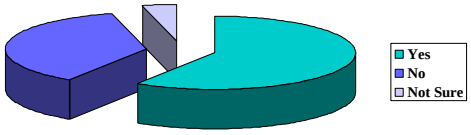
The morning after pill

Do you think that the 'morning-after' contraceptive pill should be available over the counter?

Yes	No	Not sure
59.1%	37.1%	3.8%

USA Today call-in poll, 2004

Pie Chart for Contraceptive Poll



What Is Wrong With the Poll?

- The responding group is not representative of any larger group!
- Opinions reflect only those of the people who decide to respond.
- These polls are unscientific and worthless.

READ P. 71 OF THE TEXT BOOK.

Do you have a tattoo?

Yes Men	No Men	Yes Women	No Women
15%	85%	23%	77%

Based on:
100 men
136 women
Stat100 SP 04

What is the margin of error for the different percentages?

What should you report?

Example: men who answer yes 15%

N = 100

Margin of error = .10 or 10%

Report: 15% ± 10%

So there is a huge margin of error and the 15% is fairly uncertain.

What Is Wrong With the tattoo Survey?

- What is the target population?
- What sort of sample do we have?