

Population: any collection of all objects  
or individuals of interest

⇒ Parameter: a summary number, an  
average or percent, that comes from  
the entire population (actual)

Sample: representative group from the  
Population

⇒ Statistic: summary number, an average  
or percent, that comes from the  
Sample (estimate)

PARAMETER OR STATISTIC?

1. For the studies described, identify the population, sample, population parameters, and sample statistics:  
 a) The Gallup Organization conducted a poll of 1003 Americans in its household panel to determine what percentage of people plan to cancel their summer vacation because of the increase in gasoline prices.

Pop: ~~All~~ Americans  
 households  
 Sample: 1003 American households

b) Harris Interactive surveyed 2435 U.S. adults nationwide and asked them to rate quality of American public schools.

Pop: 1.6 million 1st yr  
 Sample: 2435,000 1st yr

c) The American Institute of Education conducts an annual study of attitudes of incoming college students by surveying approximately 261,000 first-year students at 462 colleges and universities. There are approximately 1.6 million first-year college students in this country.

Pop: All the stars  
 Sample: few stars measured

Parameter: Actual distance  
 Stat: estimated average distance

2. Determine whether the numerical value is a parameter or a statistic (and explain):  
 a) A survey of 1103 students was taken from the university with 19,500 students.

b) The 2006 team payroll of the New York Mets was \$101,084,963.  
 Parameter: \$ the whole team

c) In a recent study of physics majors at the university, 15 students were double majoring in math.  
 Statistic: only getting physics majors

d) A recent survey by the alumni of a major university indicated that the average salary of 10,000 of its 300,000 graduates was \$125,000.  
 Pop: 300,000 alumni  
 Sample: 10,000 alumni  
 Parameter: actual \$  
 Stat: \$125,000 av. salary

e) The average salary of all assembly-line employees at a certain car manufacturer is \$33,000.

Margin of Error

The Margin of Error (MOE) is the maximum likely difference between the estimate and the actual value of the population mean for a given sample size.  
 (Statistic) (parameter)

We can calculate the Margin of Error using this formula:

When  $n$  is the sample size

$$\frac{1}{\sqrt{n}}$$

Examples:

- Find the MOE given the following sample sizes: A) 100 B) 375 C) 4700  
 A)  $\frac{1}{\sqrt{100}} = \pm 0.1$  B)  $\frac{1}{\sqrt{375}} = \pm 0.051$  C)  $\pm 0.015$
- What did you notice about the MOE as the sample size got larger?

It got smaller, decreased.

(NOTE): Because the Margin of Error is a difference from the actual, we often write it as an interval since the sample difference could be above or below the actual.

3. Find the appropriate sample size in order to have the following MOE: A)  $\pm 8\%$  B)  $\pm 3.5\%$

A)  $8\% \rightarrow 0.08 = \frac{1}{\sqrt{n}} \rightarrow n \approx 156.25$

4. Given the sample statistic and the Margin of Error, write an interval that would likely contain the exact percent. A) Statistic: 65% MOE:  $\pm 8\%$  B) Statistics 14% MOE:  $\pm 3.5\%$

A)  $57\% - 73\%$   
 $65 - 8 = 57$      $65 + 8 = 73$

5. Given the Interval, determine the Sample Statistics and the Margin of Error:  
 A) 63% - 81% B) 37% - 73%

A)  $81 - 63 = 18$

$\frac{18}{2} = \pm 9\%$  MOE

$72\%$  Stat