12-5 Working With Samples

Sample – Gathers information from only part of a population.

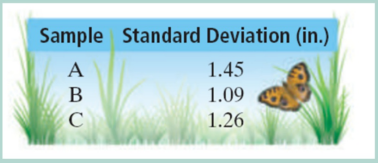
Sample Proportion $= \frac{x}{n} = \frac{\#\text{ of times the event occurs}}{\text{sample size}}$

Example 1: In a poll of 1085 voters, 564 favor Candidate A. Find the sample proportion for those who favor Candidate A. $\frac{564}{1085} = 52\%$

Random Sample – Everyone is equally likely to be chosen. It avoids biases.

The Law of Large Numbers states that the variation in a data set decreases as the sample size increases. By comparing the variation in samples, you can get an idea of their relative sizes.

Example 3: A science class measured the heights of blades of grass behind the school. The class took three samples. Use the information in the table below to decide which sample most likely was the greatest in size. Explain your reasoning.



Sample B.

The smallest std. dev. likely came from the largest sample.

In a survey, teenagers were asked to rank the importance of their relationships with their parents. The response scale ranged from 1 to 5, with 5 being extremely important. Use the info below to decide which sample was most likely the greatest in size.

Sample	Score	Standard Deviation
A	4.4	1.4
B	4.6	0.6
C	4.6	1.2

Sample B.

Smallest standard deviation likely came from largest sample

Margin of Error – An estimate of error for a sample proportion.

Margin of Error Formula

When a random sample of size n is taken from a large population, the sample proportion has a margin of error of $\approx \pm \frac{1}{\sqrt{n}}$

Example 4: Estimate the sample size for each margin of error.

A. ±10%

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

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

$\sqrt{n} = 10$

$n = 100$

B. ±4%

$.04 = \frac{1}{\sqrt{n}}$

$\frac{.04\sqrt{n}}{.04} = \frac{1}{.04}$

$\sqrt{n} = 25$

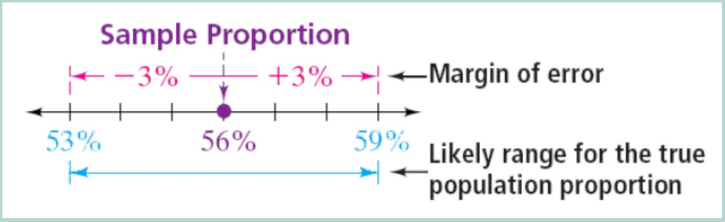
$n = 625$

C. ±2%

$.02 = \frac{1}{\sqrt{n}}$

$\sqrt{n} = \frac{1}{.02}$ $\sqrt{n} = 50$ $n = 2500$

You can use the margin of error to determine the likely range for the true population proportion. If a poll reports that 56% of voters favor Candidate B, with a margin of error of ±3%, the graph below shows the range for the population.



Example 5: In a poll of 123 students, 87 have never ridden a ferry. Find the sample proportion, the margin of error, and the interval likely to contain the true population proportion.

$\frac{87}{123} = 71\%$

$e = \frac{1}{\sqrt{123}} = .09 = 9\%$

$71 - 9$ (71) $71 + 9$

62% — 80% is interval

homework:
page 666 # 2-20 even, 26, 28