SECTION 8.1 Exercises

In Exercises 1 to 4, determine the point estimator you would use and calculate the value of the point estimate.

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1. **Got shoes?** How many pairs of shoes, on average, do female teens have? To find out, an AP Statistics class conducted a survey. They selected an SRS of 20 female students from their school. Then they recorded the number of pairs of shoes that each student reported having. Here are the data:

50	26	26	31	57	19	24	22	23	38
13	50	13	34	23	30	49	13	15	51

Point Estimator is the statistic to estimate the Population parameter

Point Estimate is the specific value.

Review how to find mean and S.D for a list of data:

① Create L1 with the data

② (STAT) 1 VAR > $\bar{x} = 30.35$ $S_x = 13.88$

① Point Estimator is the mean number of shoes ($\bar{x}$)

Point Estimate is $\bar{x} = 30.35$ shoes

② Point Estimator is the sample variance of the number of shoes (s_x^2)

POINT ESTIMATE is

$s_x^2 = (13.88)^2 = 202.77$

8.1 HW #'s 5+7

(5) NAEP TEST GIVEN TO SRS $n = 840$

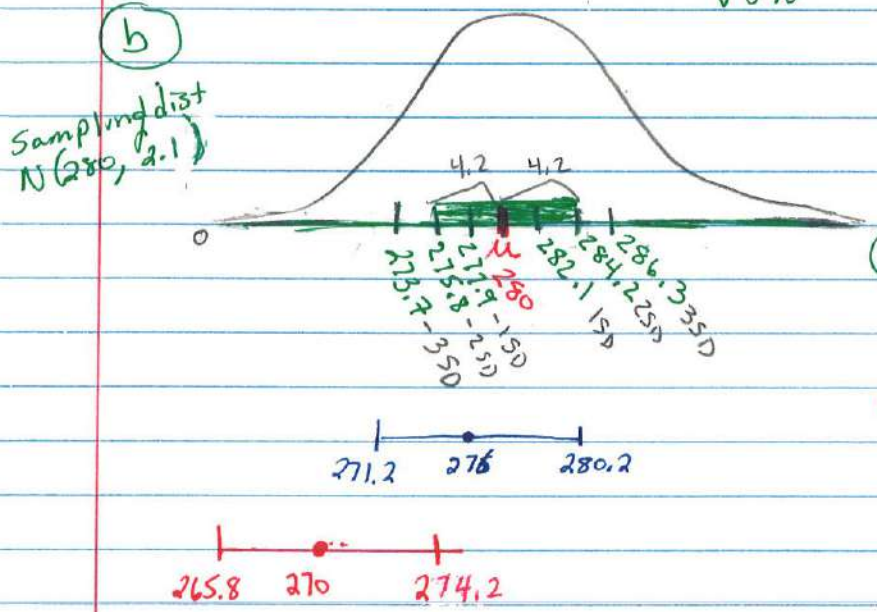
Given $\mu_{\bar{x}} = 280$

$\sigma_{\bar{x}} = 60$

(a) Sampling Distribution of $\bar{x}$

- since the sample is large (based on CLT) the shape is approximately normal
- Center - $\mu_{\bar{x}} = 280$
- Spread - $\sigma_{\bar{x}} = \frac{60}{\sqrt{840}} \approx 2.07$

(b)



(c) 95% - Mean ± 2 SD.

$m = 2(2.1) = 4.2$

(d) The population mean μ lies in the Confidence interval $\bar{x} \pm 4.2$. That is 95% of all possible samples (of size 840) will capture the true mean μ

(7) $\bar{x}$ INSIDE Given CI - chose $276 = \bar{x} \pm 2SD(2.1) \rightarrow [271.2, 280.2]$

* This New CI captures the true population mean of 280

$\bar{x}$ OUTSIDE Given CI - Chose $\bar{x} = 270 \pm 2SD(2.1) \rightarrow [265.8, 274.2]$

* This new CI does NOT capture the true population mean of 280

15. **Shoes** The AP Statistics class in Exercise 1 also asked an SRS of 20 boys at their school how many shoes they have. A 95% confidence interval for the difference in the population means (girls – boys) is 10.9 to 26.5. Interpret the confidence interval and the confidence level.

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You must be able to write CI and CL in context USING THE FOLLOWING FORMAT !!

CONFIDENCE INTERVAL (CI):

WE ARE 95% CONFIDENT THAT THE INTERVAL FROM 10.9 to 26.5 CAPTURES THE TRUE DIFFERENCE IN THE AVERAGE NUMBER OF PAIRS OF SHOES OWNED BY GIRLS AND BOYS (Girls - Boys)

CONFIDENCE LEVEL (CL):

IF THIS SAMPLING METHOD WERE EMPLOYED MANY, MANY TIMES, APPROXIMATELY 95% OF THE RESULTING CONFIDENCE INTERVALS WOULD CAPTURE THE TRUE DIFFERENCE AVERAGE PAIRS SHOES BETWEEN BOYS AND GIRLS.

Multiple choice: Select the best answer for Exercises 21 to 24.

21. A researcher plans to use a random sample of $n = 500$ families to estimate the mean monthly family income for a large population. A 99% confidence interval based on the sample would be _____ than a 90% confidence interval.

(a) narrower and would involve a larger risk of being incorrect

(b) wider and would involve a smaller risk of being incorrect

(c) narrower and would involve a smaller risk of being incorrect

(d) wider and would involve a larger risk of being incorrect

(e) wider, but it cannot be determined whether the risk of being incorrect would be larger or smaller

99% CI is wider to capture true population parameter

90% CI

22. In a poll,

I. Some people refused to answer questions.

II. People without telephones could not be in the sample.

III. Some people never answered the phone in several calls.

Which of these sources is included in the ±2% margin of error announced for the poll?

(a) I only (c) III only (e) None of these

(b) II only (d) I, II, and III

* IMPORTANT POINT OF MARGIN OF ERROR (ME)

ME accounts for variability due to random selection/assignment. ME does NOT compensate for any bias in the data collection process.

23. You have measured the systolic blood pressure of an SRS of 25 company employees. A 95% confidence interval for the mean systolic blood pressure for the employees of this company is (122, 138). Which of the following statements gives a valid interpretation of this interval?

DEFINITION

(a) 95% of the sample of employees have a systolic blood pressure between 122 and 138.

(b) 95% of the population of employees have a systolic blood pressure between 122 and 138.

(c) If the procedure were repeated many times, 95% of the resulting confidence intervals would contain the population mean systolic blood pressure.

(d) The probability that the population mean blood pressure is between 122 and 138 is 0.95.

(e) If the procedure were repeated many times, 95% of the sample means would be between 122 and 138.

24. A polling organization announces that the proportio of American voters who favor congressional term limits is 64%, with a 95% confidence margin of erro of 3%. If the opinion poll had announced the margi of error for 80% confidence rather than 95% confidence, this margin of error would be

(a) 3%, because the same sample is used.

(b) less than 3%, because we require less confidenc

(c) less than 3%, because the sample size is smaller

(d) greater than 3%, because we require less confidence.

(e) greater than 3%, because the sample size is smaller.

24) ME = Critical Value * SD(statistic)