

4/22/19-1 027

8.4 CONFIDENCE INTERVALS

POPULATION X_1, \dots
X TAKE A SAMPLE OF SIZE N
WHAT CAN WE SAY ABOUT ITS
MEAN? \bar{X}_N

WE'D LIKE TO SAY

$$|\bar{X} - \bar{X}_N| < a$$

95% OF THE SAMPLES

Q, SAT $\bar{X} = 500$ $\sigma = 100$

TAKE A SAMPLE $N = 100$

X_{100} : THIS IS A STATISTIC

IT HAS A MEAN + STD.

$$\overline{X}_{100} = \bar{X}$$

$$\text{STD}[\overline{X}_{100}] = \frac{\text{STD}[X]}{\sqrt{N}} = \frac{100}{10} = 10$$

\overline{X}_{100} IS IN INTERVAL

(490, 510)

(480, 520)

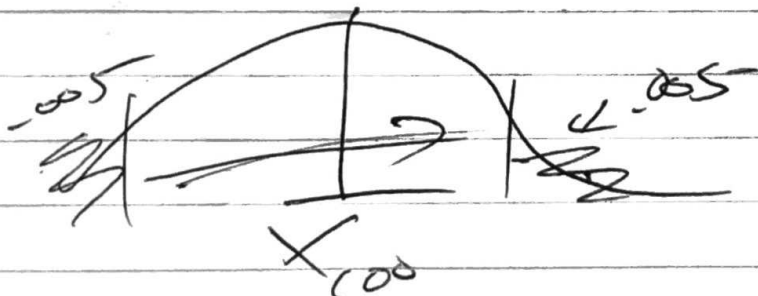
$\frac{2}{3}$ OF TIME.

TO FIND INTERVAL SIZE =
GIVEN PROB.

I WANT TO FIND INTERVAL \Rightarrow

X_{100} IS IN IT $p = .99$

2-SIDED



p 414

$z = 3.3$

(467, 533)

2 WAYS TO LOOK AT CONFIDENCE INTERVAL

1. KNOWING POP MEAN, FIND INTERVAL FOR SAMPLE MEAN

2. WE DO NOT KNOW POP MEAN. WE HAVE A SAMPLE. FIND AN INTERVAL FOR UNKNOWN POP MEAN.

WE DO KNOW POP STD. $\sigma = 100$.

WE MEASURE 100 STUDENTS.

OBSERVE $\bar{X}_{100} = 480$.

WHAT CAN WE SAY ABOUT UNKNOWN POP MEAN? μ

$$\bar{X}_{100} - D \leq \mu \leq \bar{X}_{100} + D$$

WITH PROB. 99%.

$$447 \leq \mu \leq 513 \quad P = 99\%$$