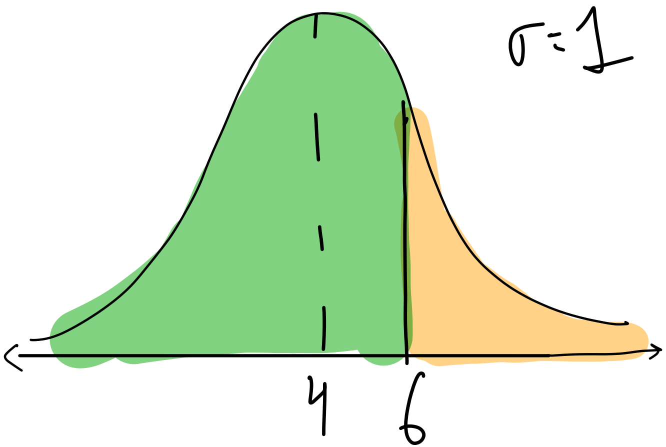
CONFIDENCE INTERVAL

The average time taken for customers to complete a purchase is 4 minutes with a standard deviation of 1 minute.
Find the probability that a randomly selected customer will complete a purchase within 6 minutes? Assume Gaussian



$\sigma = 1$

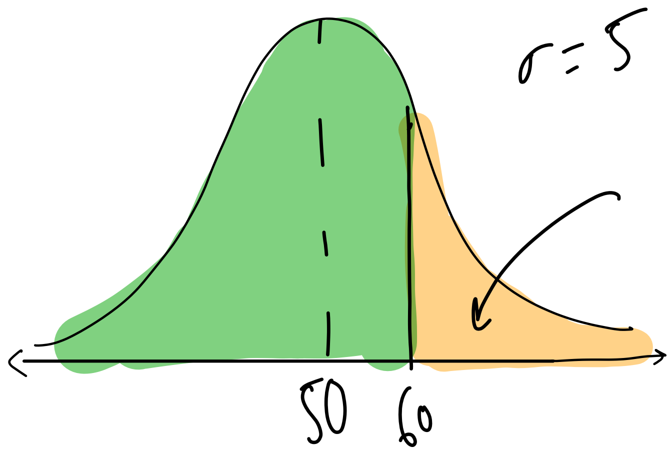
33 users have participated

A	0.85	12%
B	0.93	9%
C	0.95	9%
D	0.97	70%

norm.cdf( )

$\boxed{0.97}$

The average order value on an e-commerce website is $50, with a standard deviation of $5.
What is the probability that a randomly selected order will have a value exceeding $60?

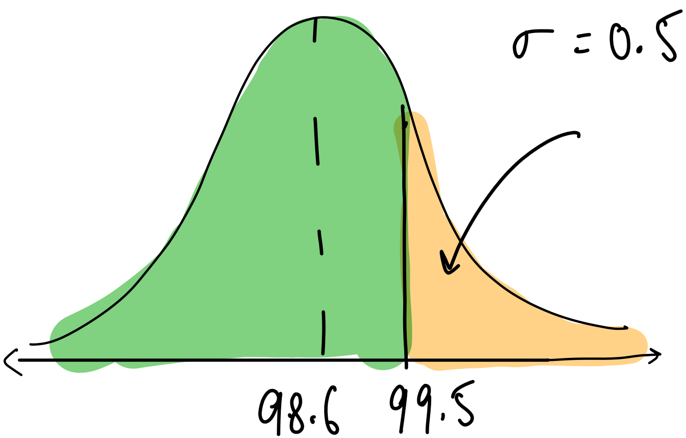


39 users have participated

A	0.02	77%
B	0.04	8%
C	0.06	10%
D	0.08	5%

1 − green = Orange

Average body temperature has a mean of 98.6°F and a standard deviation of 0.5°F.
What is the probability that a randomly chosen patient has a body temperature higher than 99.5°F?



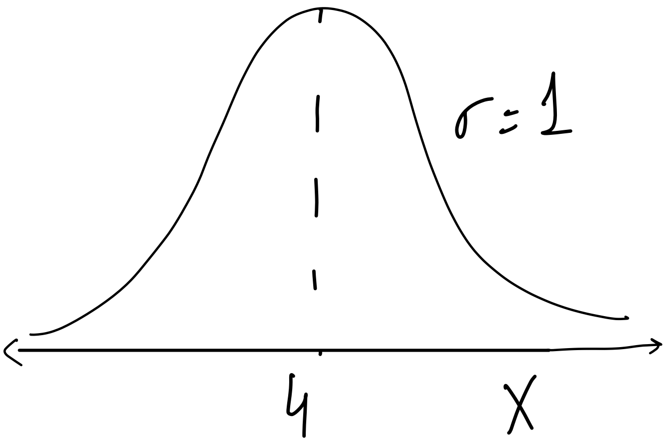
36 users have participated

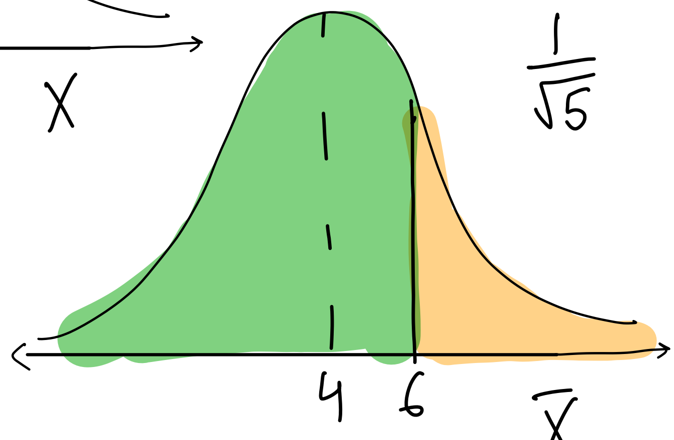
A	0.01	8%
B	0.03	83%
C	0.05	6%
D	0.07	3%

The average time taken for customers to complete a purchase is 4 minutes with a standard deviation of 1 minute.
What is the probability that the average time of the next 5 customers is less than 6 minutes?

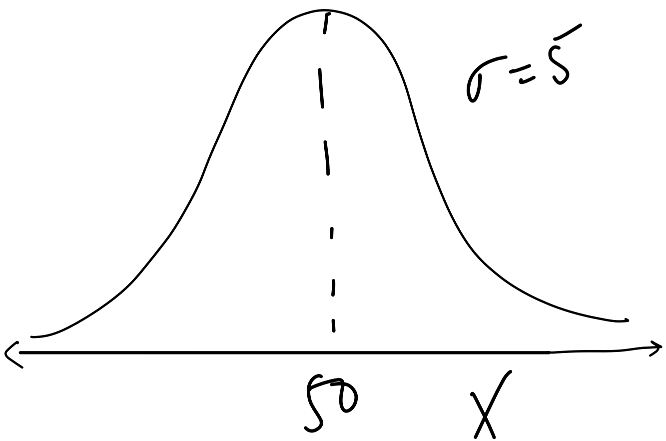
34 users have participated

A	0.96	3%
B	0.97	15%
C	0.98	12%
D	0.99	71%





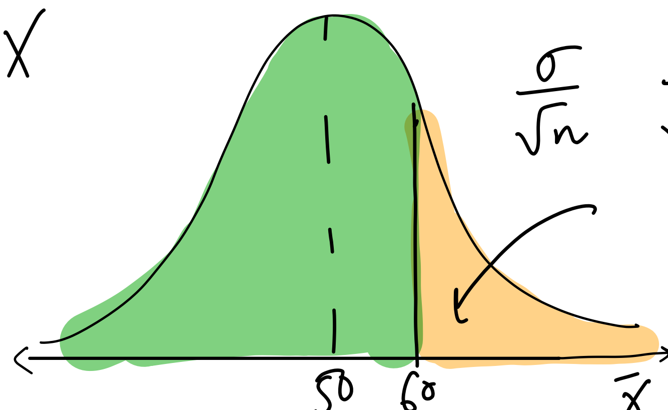
The average order value on an e-commerce website is \$50, with a standard deviation of \$5.
What is the probability that the average of the next 3 orders exceeds \$60?



$\sigma = 5$

36 users have participated

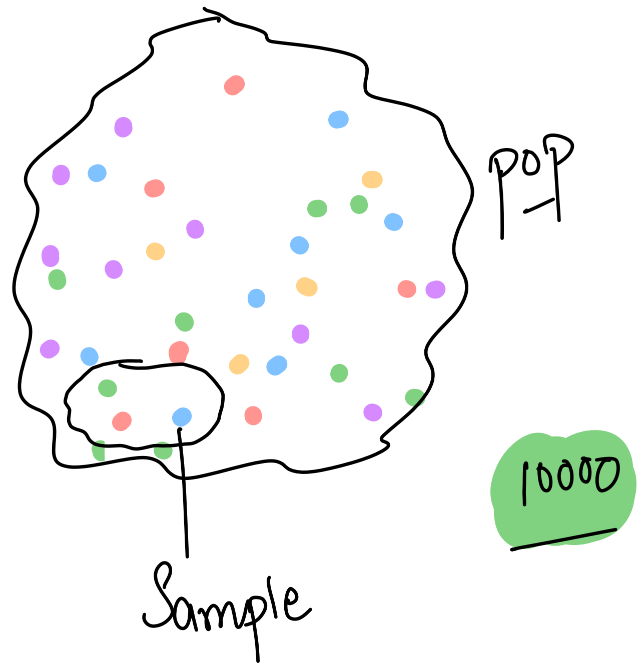
A	0.002	75%
B	0.004	14%
C	0.006	8%
D	0.008	3%



$\frac{\sigma}{\sqrt{n}}$ $\frac{5}{\sqrt{3}}$

Sample → making conclusions about pop.

1. CLT ←
2. Bootstrapping ←



$S_1 = [\, x_1 \;\; x_2 \;\; \dots \;\dots \;\; x_{20} \,]$ $\quad \bar{X}_{S_1} \quad \sigma_{S_1}$

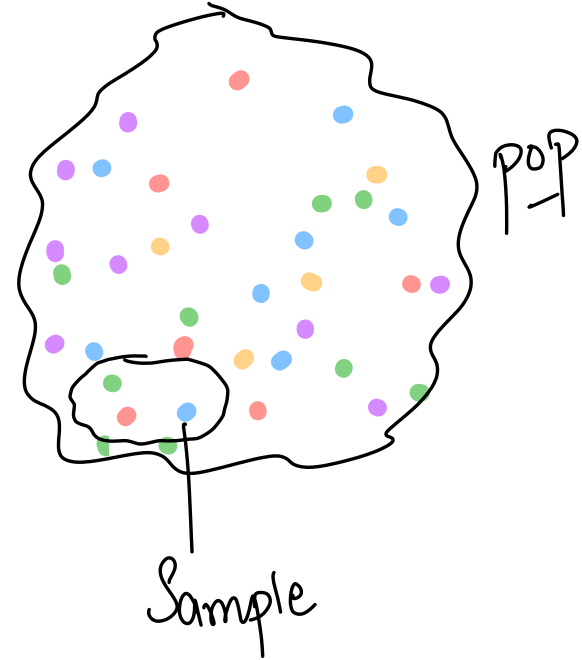
$S_2 = [\, \_ \;\; \_\_ \;\; \_ \;\; \_ \,]$ $\quad \bar{X}_{S_2}$

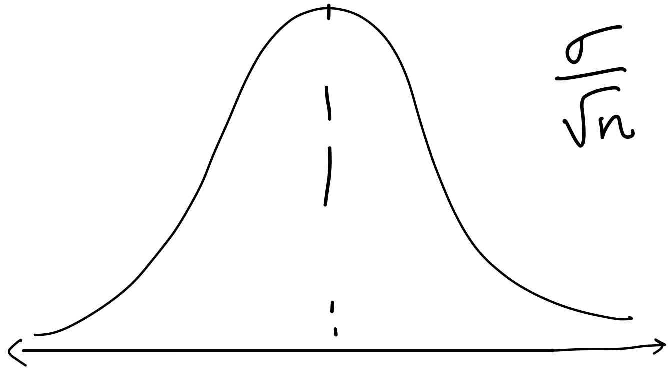
$S_3 = [\, \_ \;\; \_\_ \;\; \_ \;\; \_ \,]$ $\quad \bar{X}_{S_3}$

$S_4 = [\, \_ \;\; \_\_ \;\; \_ \;\; \_ \,]$ $\quad \bar{X}_{S_4}$

$\vdots$

$S_{10000} = [\, \_ \;\; \_\_ \;\; \_ \;\; \_\,\_ \,]$ $\quad \bar{X}_{S_{10000}}$





μ $\qquad$ $\bar{X}$

$\frac{\sigma}{\sqrt{n}}$ Standard error

σ = popn std

$$\sigma = \sqrt{\frac{\sum_{i=1}^{n} (x_i - \mu)^2}{n}}$$

Sample $\quad S_1 = X_1\ X_2\ X_3\ X_4 \ldots \ldots X_{20}$

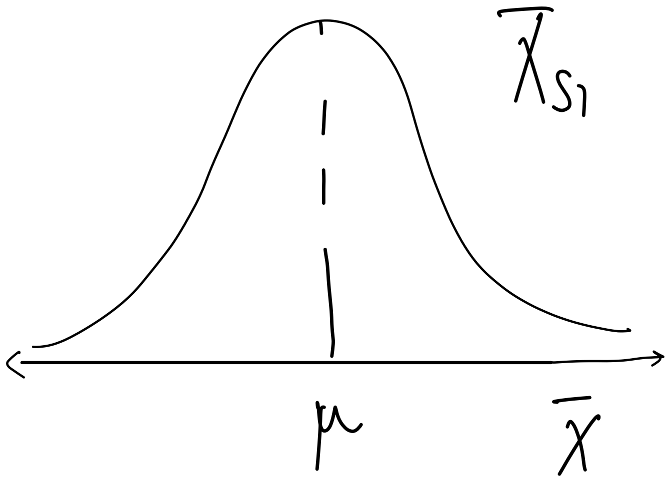
Sample $= (X_1 + X_2 + X_3 \ldots X_{20})/20 = \bar{X}_{S_1}$

Sample std $= \sqrt{\frac{\sum (x_i - \bar{x}_{S_1})^2}{n-1}}$

Unbiased estimator.

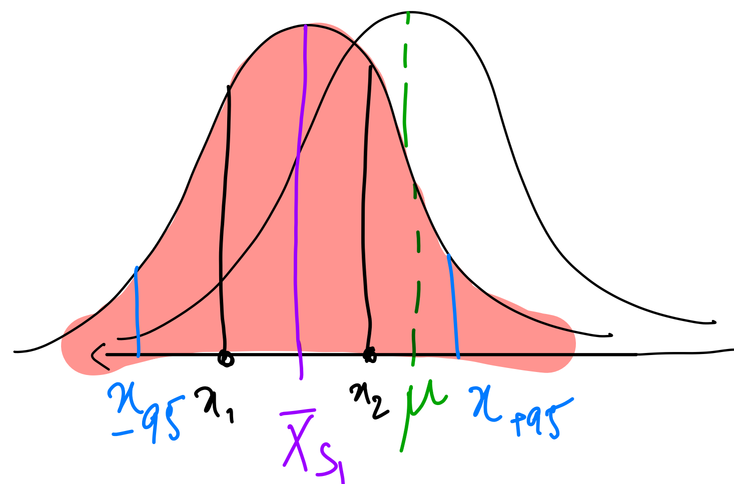
Student t distribution

Bessel Correction



$\bar{X}_{S_1}$
μ
$\bar{X}$

x_1
$\bar{X}_{S_1}$
μ
x_2



x_{-95}
x_1
$\bar{X}_{S_1}$
x_2
μ
x_{+95}

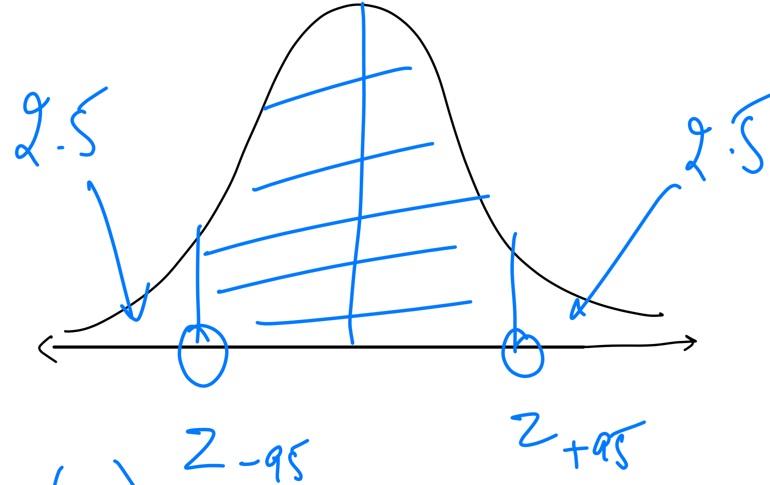
1. pop mean ?? pop std ✓ ✓
2. pop mean ?? pop std X

95%

$$-1.96 < \frac{\bar{X}_{s_1} - \mu}{\sigma/\sqrt{n}} < 1.96$$

$$Z = \frac{\bar{X}_{s_1} - \mu}{\sigma/\sqrt{n}}$$

$$Z_{-.95} < \frac{\bar{X}_{S_1} - \mu}{\sigma/\sqrt{n}} < Z_{+.95}$$

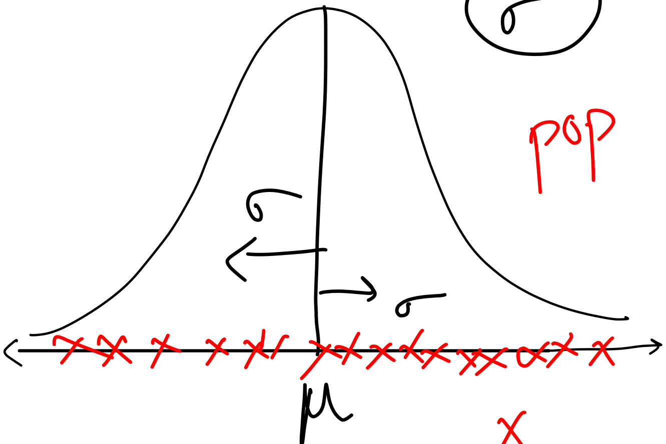


$$\bar{X}_{S_1} - Z_{-.95}\left(\frac{\sigma}{\sqrt{n}}\right) < \mu < \bar{X}_{S_1} + Z_{+.95}\left(\frac{\sigma}{\sqrt{n}}\right)$$

μ

$$\left[\bar{X} - \left(\frac{\sigma}{\sqrt{n}}\right)Z,\ \bar{X} + \left(\frac{\sigma}{\sqrt{n}}\right)Z\right]$$

$$\left[\bar{X} - \left(\frac{s}{\sqrt{n}}\right)z,\ \bar{X} + \left(\frac{s}{\sqrt{n}}\right)z\right]$$

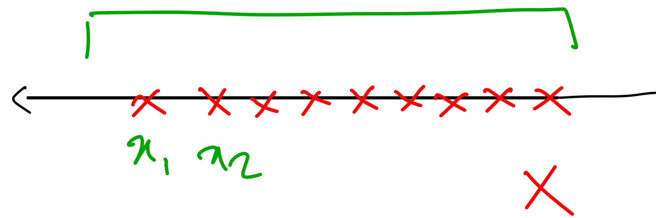


σ

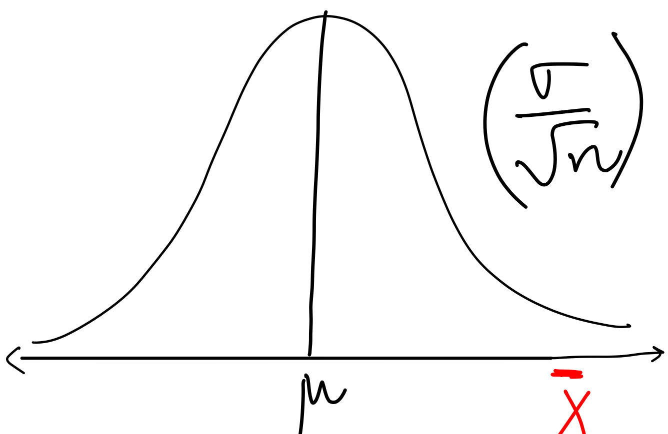
pop

$$S = \sqrt{\frac{\sum (x_1 - \bar{x})^2}{n-1}}$$

Sample



$\bar{X}_{s_1}$



$$\left(\frac{\sigma}{\sqrt{n}}\right)$$

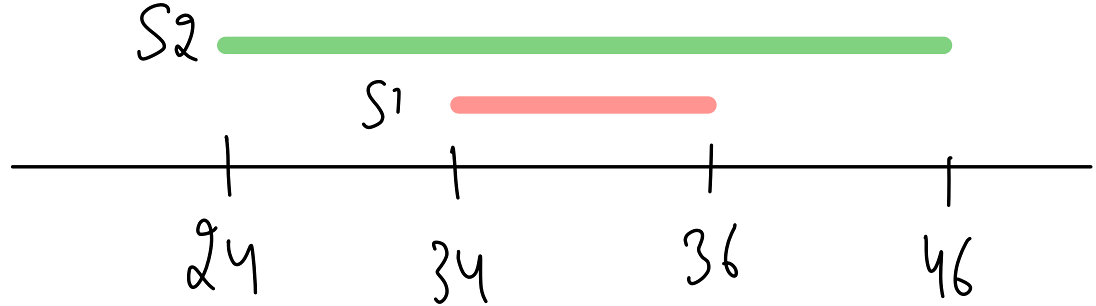
$$\left[\bar{x} \pm \left(\frac{\sigma}{\sqrt{n}}\right) z\right]$$

$$\left[\bar{x} \pm \left(\frac{s}{\sqrt{n}}\right) z\right]$$

S1 : [35, 36, 33, 37, 34, 35] $\mu = 35$

S2 : [20, 37, 17, 50, 53, 33] $\mu = 35$

Bootstrapping: Samples (Repitition is allowed)



95%

S1 [34, 36]

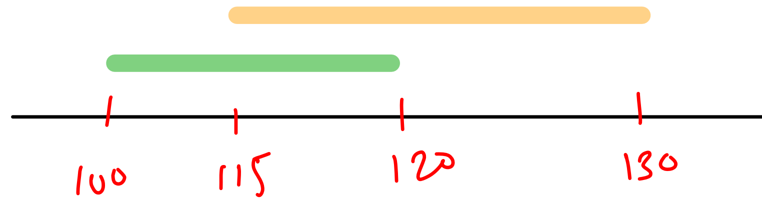
S2 [24, 46]

Google

95%

Indians [115 - 130]

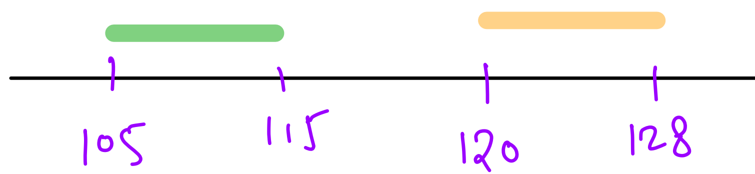
Non Indians [100 - 120]



90%

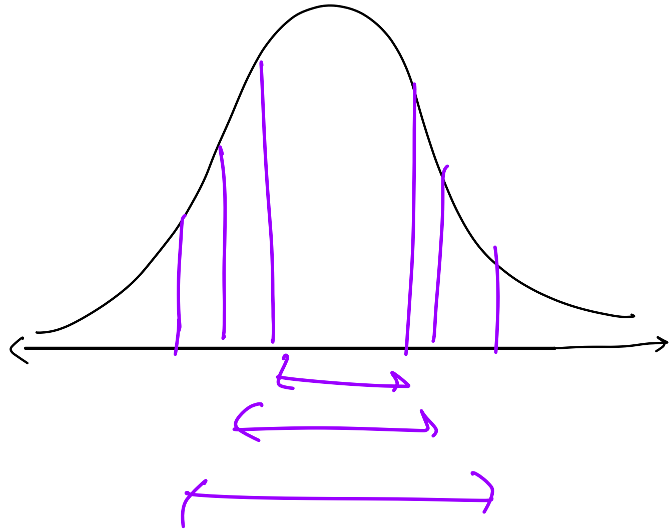
Indians [120 - 128]

Non Indians [105 - 115]



90% Confidence

Avg Salaries Indian ≠ Non Indian



$\downarrow$ CI

R $\downarrow$

CI $\uparrow$ 100%

R $\uparrow$