Sampling error and distribution

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Sampling error

The difference between statistic and parameter

$$\bar{y} - \mu$$

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Sampling distribution

Distribution of our statistic from multiple samples

$$\hat{f}(\bar{y})$$

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What is the mean height of an adult in the NHANES dataset?

- Population: Adults in the NHANES dataset
- Mean height: $\mu = 168.9$
- Standard deviation: $\sigma = 10.1$

(Assume we do not know this)

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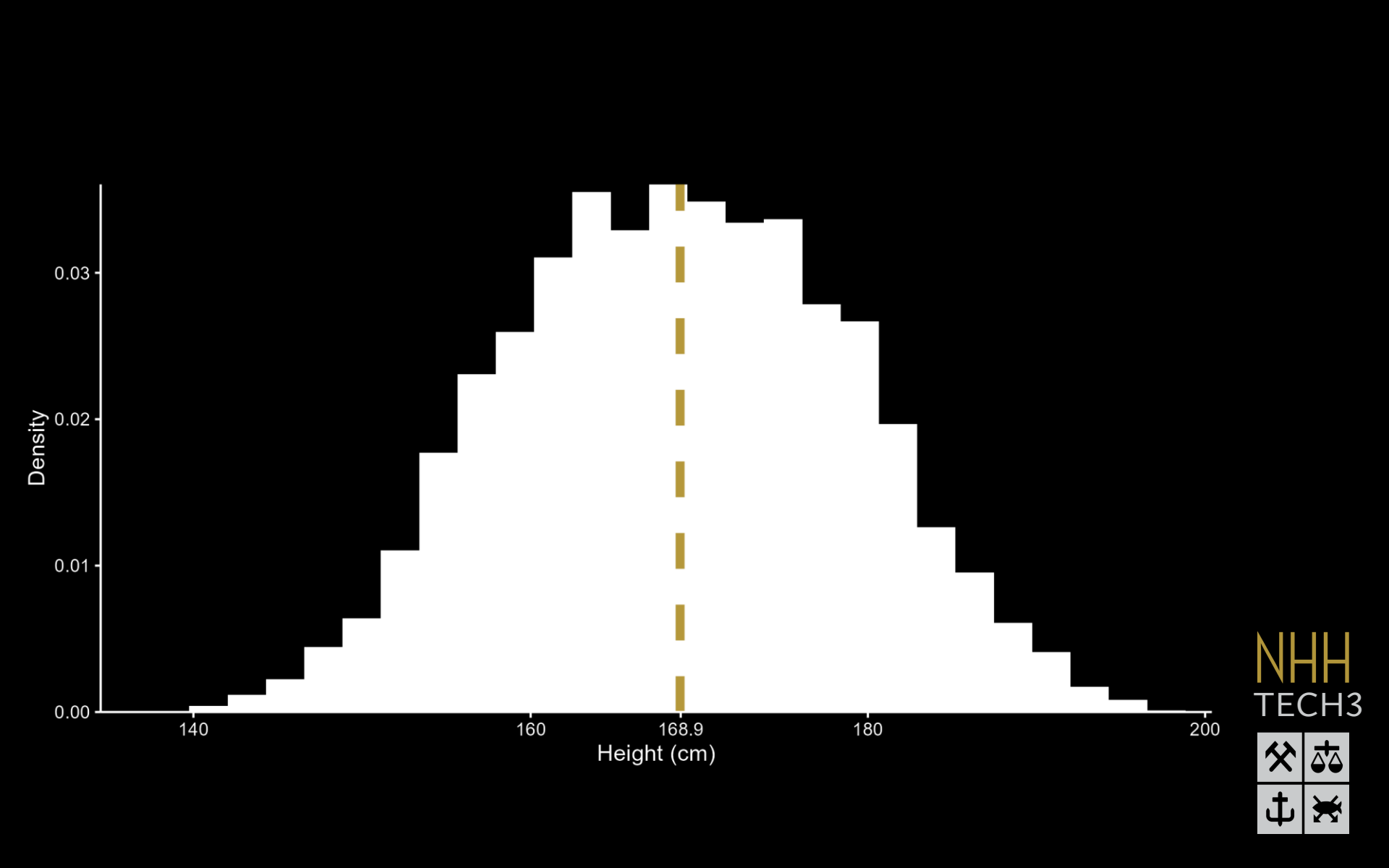

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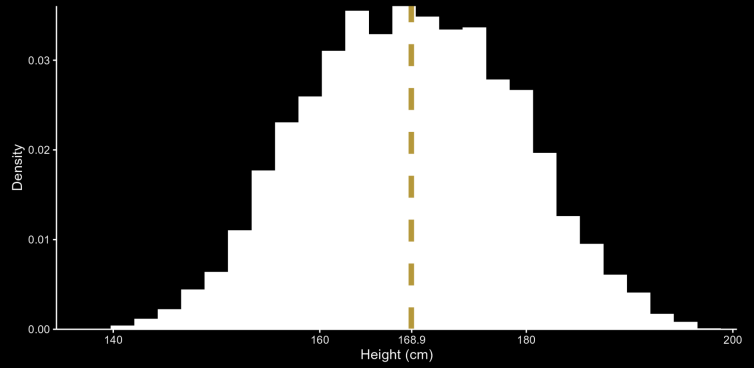

172.9
171.7
172.5
155.1
156.8
180.1
163.9
150.1
166.6
163.6

$\bar{y} = 165.33$

Sampling error:

$\bar{y} - \mu =$

$165.33 - 168.9 = -3.57$

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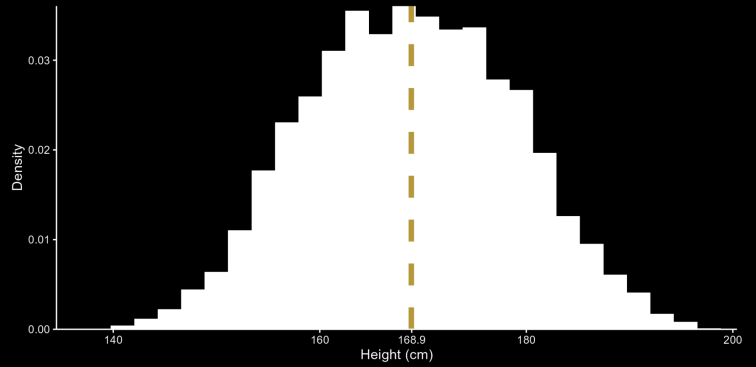

172.9	172.3
171.7	157.1
172.5	176.8
155.1	169.6
156.8	164.6
180.1	174.4
163.9	157.7
150.1	173.0
166.6	158.2
163.6	174.1
$\bar{y}$ = 165.33	167.78

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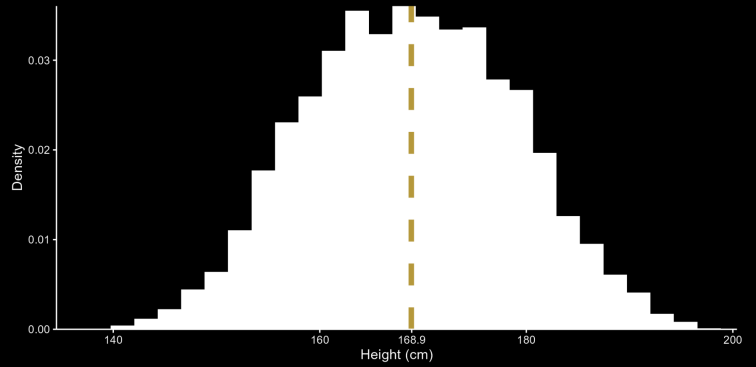

172.9	172.3	152.9
171.7	157.1	174.3
172.5	176.8	174.2
155.1	169.6	168.3
156.8	164.6	168.6
180.1	174.4	164.5
163.9	157.7	188.6
150.1	173.0	157.7
166.6	158.2	173.1
163.6	174.1	148.5
$\bar{y}$ = 165.33	167.78	167.07

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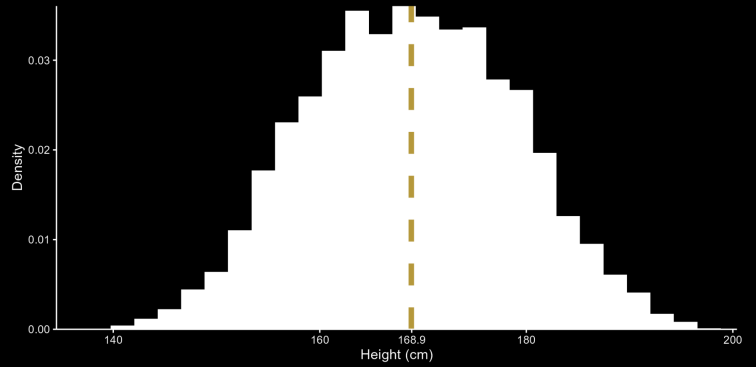

172.9	172.3	152.9	181.7
171.7	157.1	174.3	172.2
172.5	176.8	174.2	166.3
155.1	169.6	168.3	174.8
156.8	164.6	168.6	163.1
180.1	174.4	164.5	174.3
163.9	157.7	188.6	168.4
150.1	173.0	157.7	163.3
166.6	158.2	173.1	158.6
163.6	174.1	148.5	167.4

$\bar{y}$ = 165.33 167.78 167.07

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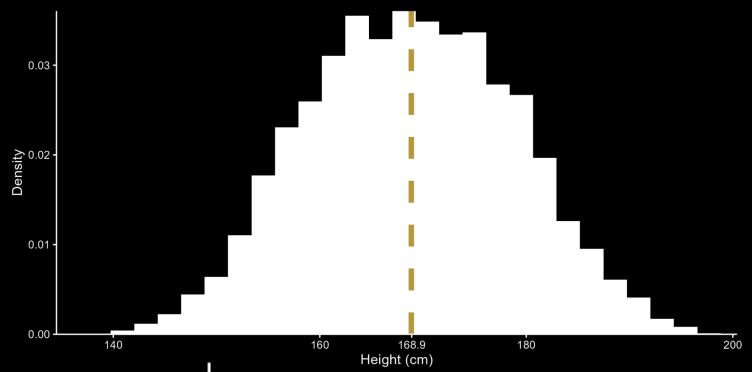
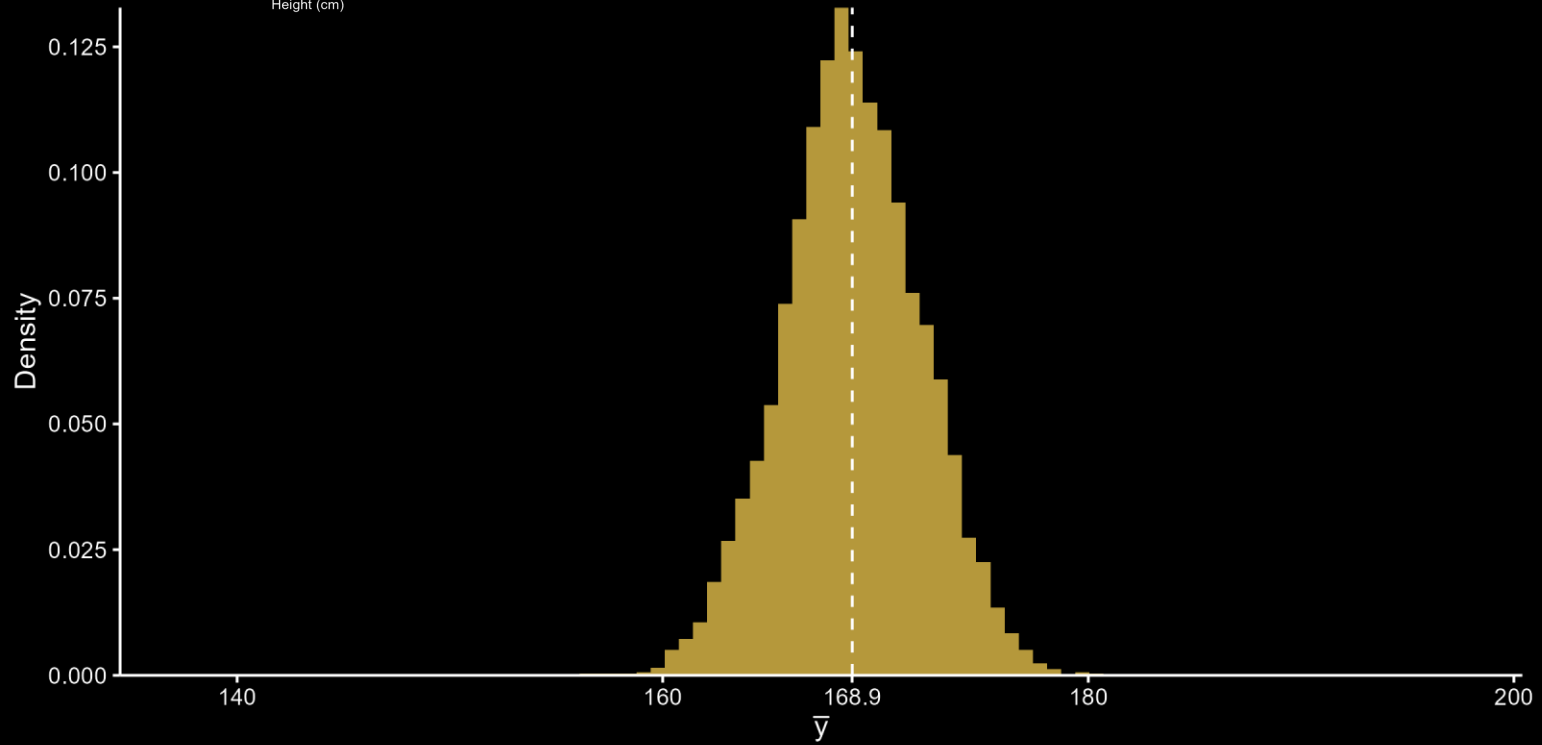

0.03
0.02
0.01
0.00
Density
140
160
168.9
180
200
Height (cm)


0.125
0.100
0.075
0.050
0.025
0.000
Density
140
160
168.9
180
200
$\bar{y}$

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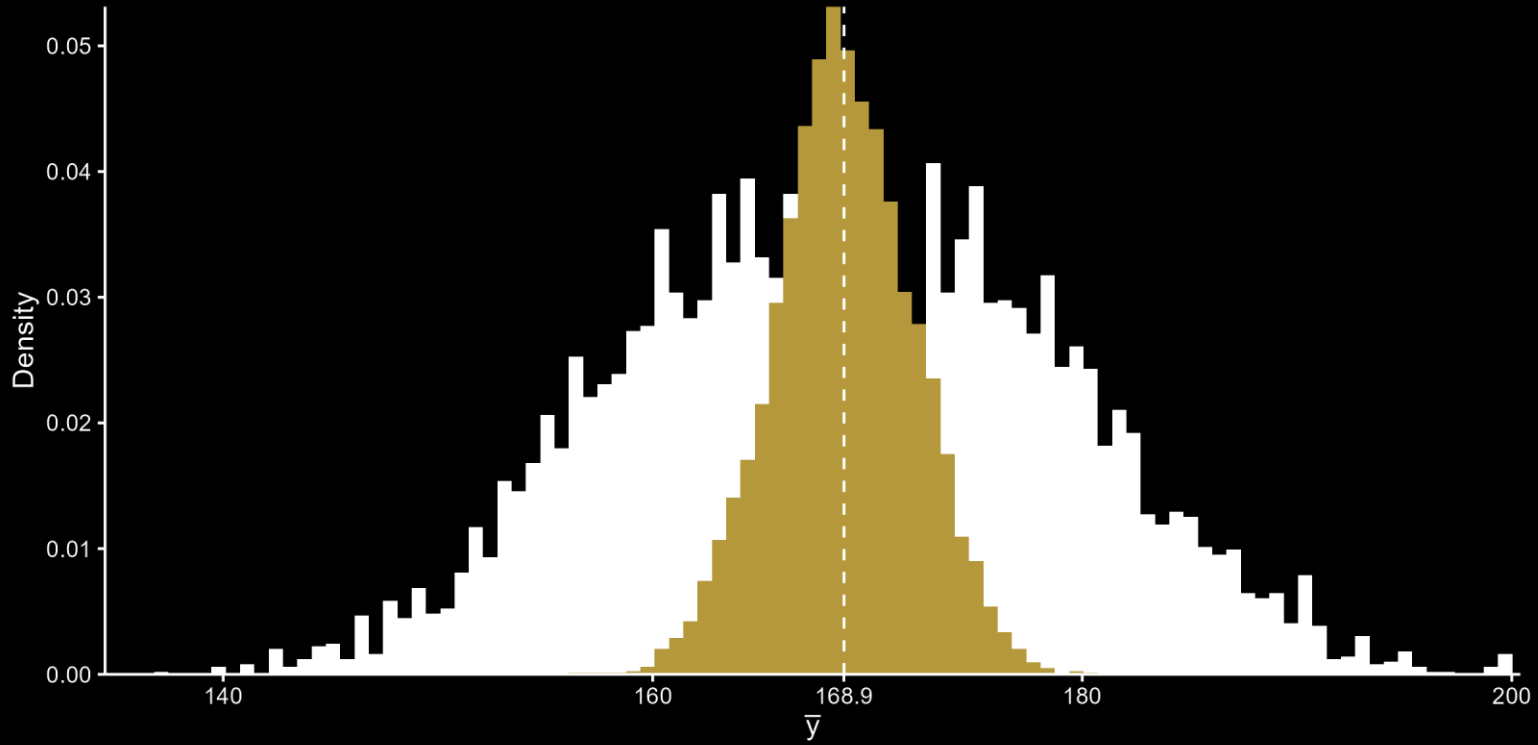
Sample size 10



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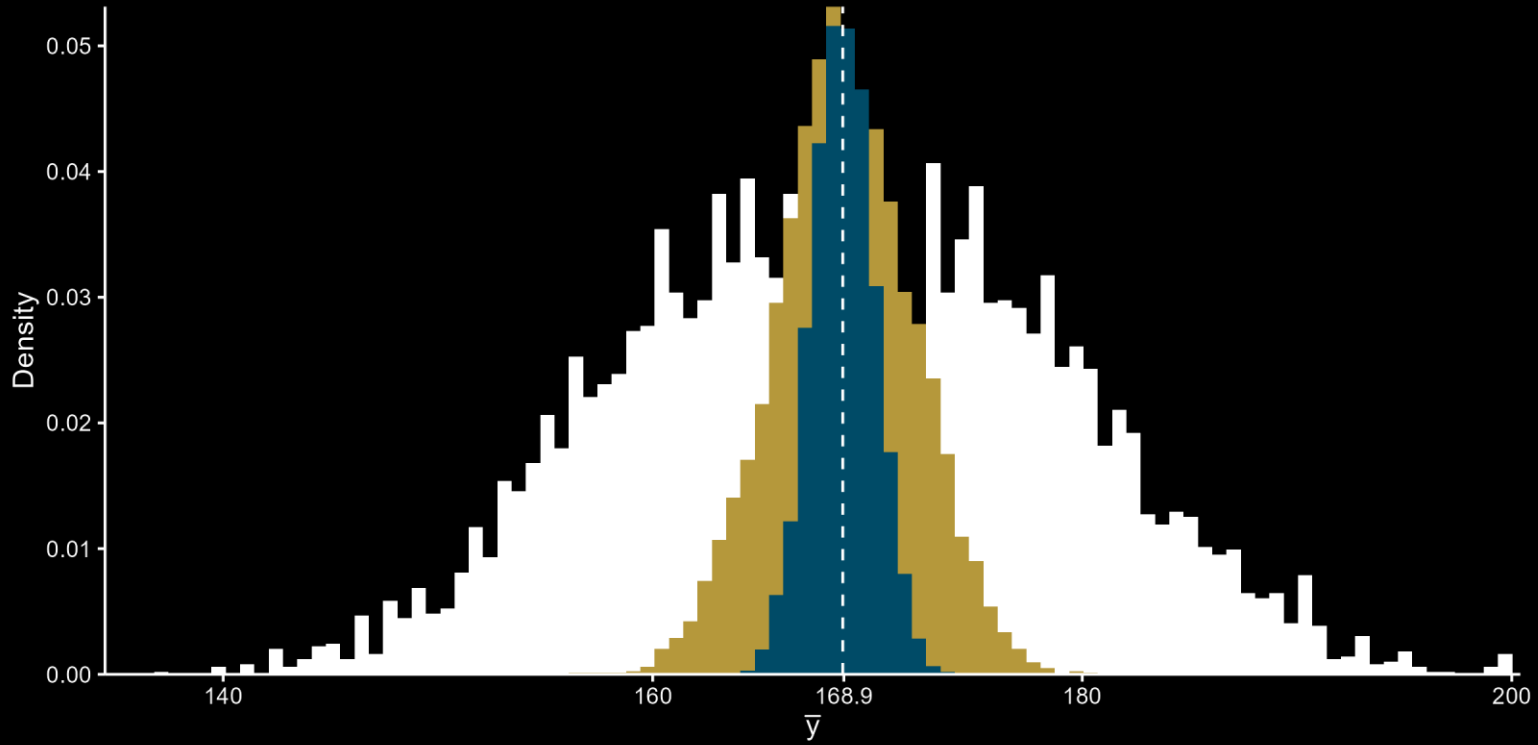
Sample size 10

Sample size 50



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	Mean	Standard deviation
Population	168.9	10.1
$\bar{y}_{10}$	168.9	3.21
$\bar{y}_{50}$	168.9	1.45

$$SD(\bar{Y}_n) = \frac{\sigma}{\sqrt{n}}$$

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NHH

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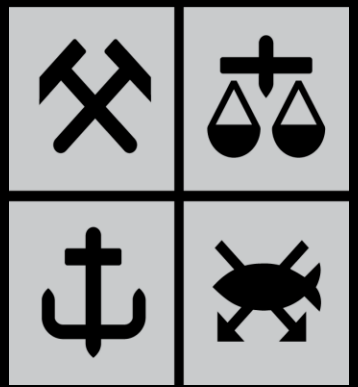

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