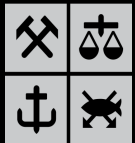


BOOTSTRAP

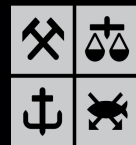


NHH
TECH3

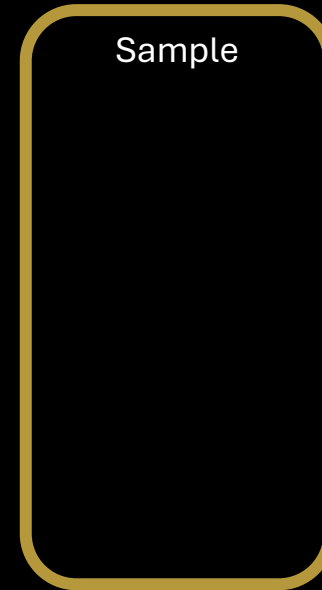
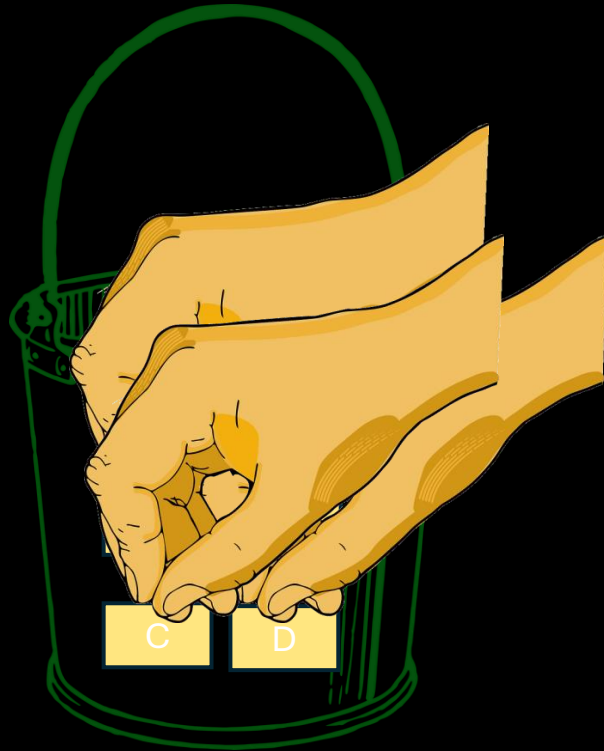




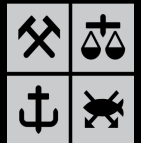
NHH
TECH3



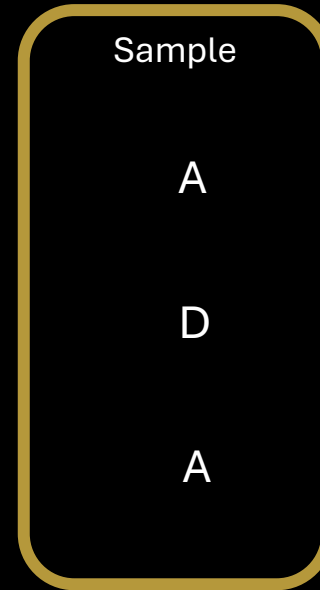
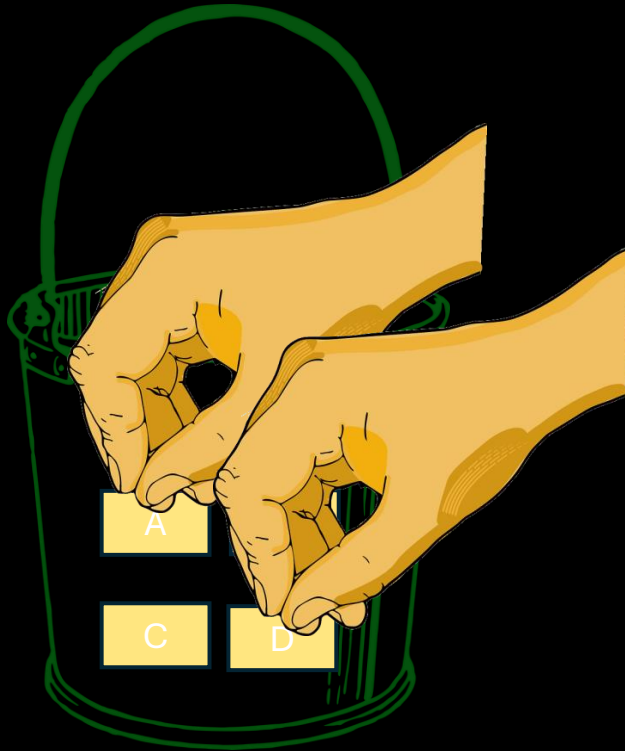
SAMPLING WITHOUT REPLACEMENT



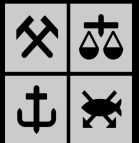
NHH
TECH3



SAMPLING WITH REPLACEMENT



NHH
TECH3



BOOTSTRAP METHOD

1. Repeatedly resample from the sample **with replacement**
2. Compute the variable of interest on each bootstrap sample
3. Use the distribution of those estimates as the sampling distribution

EXAMPLE: BOOTSTRAPING THE MEAN

We have measured the height of ten 20-year-old male athletes

183 179 179 183 178 176 182 177 180 179

Mean height is 179.6 cm and standard deviation is 2.41.

Standard error of the mean is approximately

$$\frac{SD(x)}{\sqrt{n}} = \frac{2.41}{\sqrt{10}} = 0.76$$

1823 1773 1773 1773 1773 1773 1776 1772 1772 1779 1779

Mean

Bootstrap
sample 1

178.9

Bootstrap
sample 2

180.5

Bootstrap
sample 3

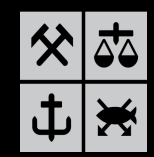
179.5

Bootstrap
sample 4

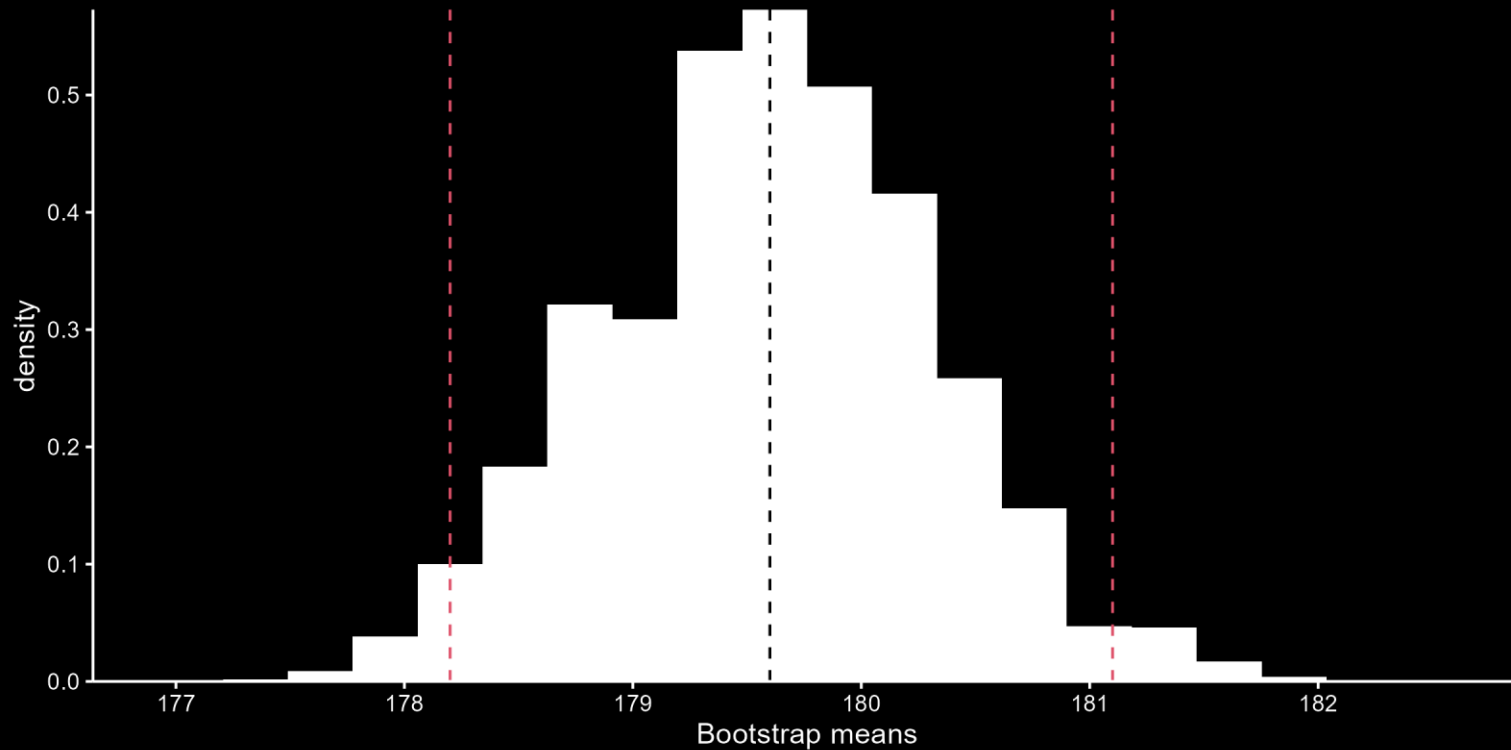
178.2



NHH
TECH3

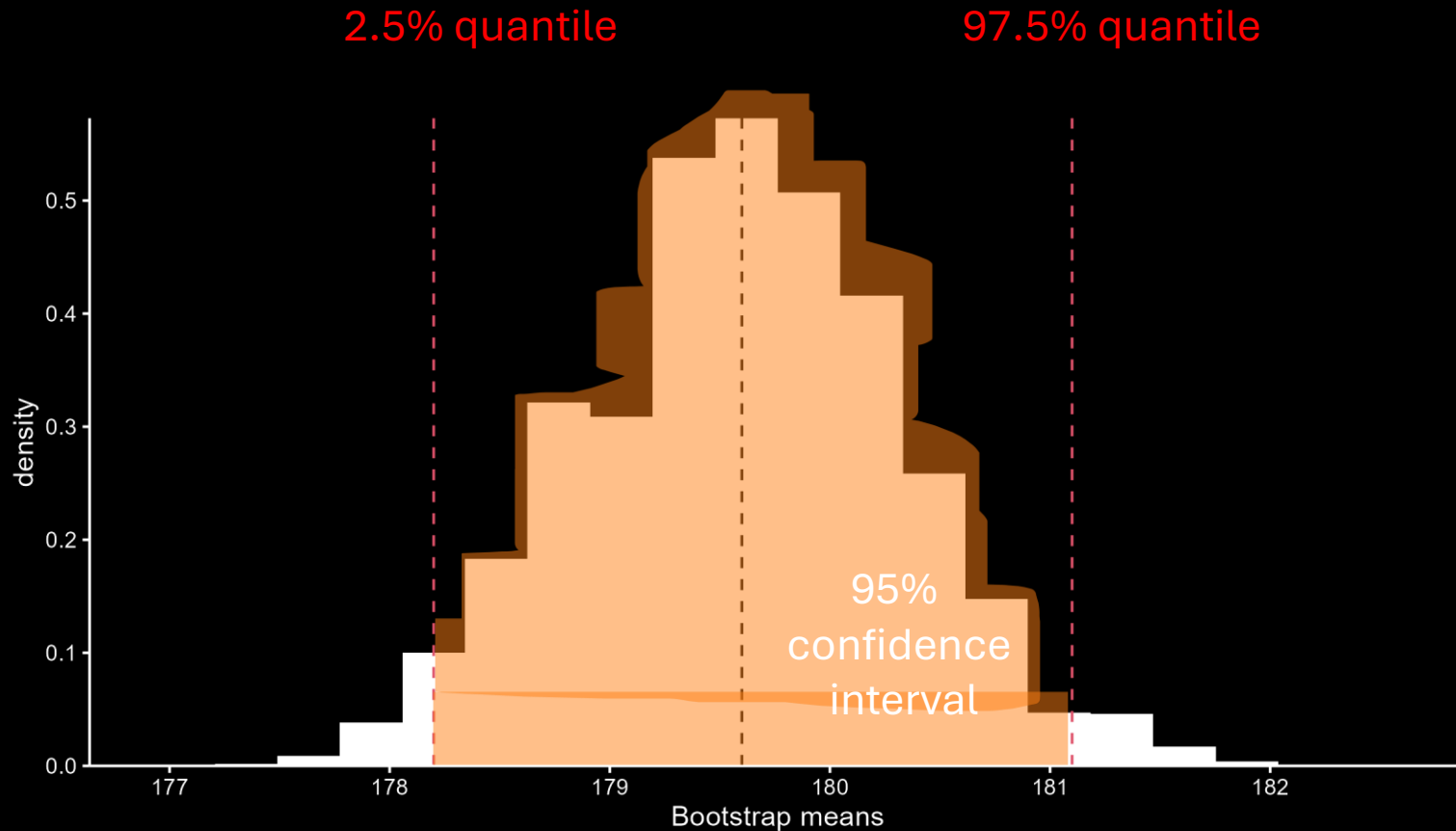


178.9 180.5 179.5 178.2 179.9 178.8 180.4 179.8

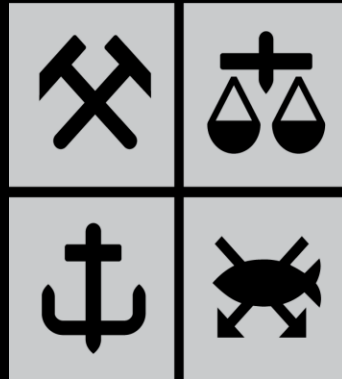


Standard error of the bootstrap means is 0.73

$$\left(\frac{SD(x)}{\sqrt{n}} = \frac{2.41}{\sqrt{10}} = 0.76 \right)$$



NHH TECH3



Sondre Hølleland
Geir Drage Berentsen