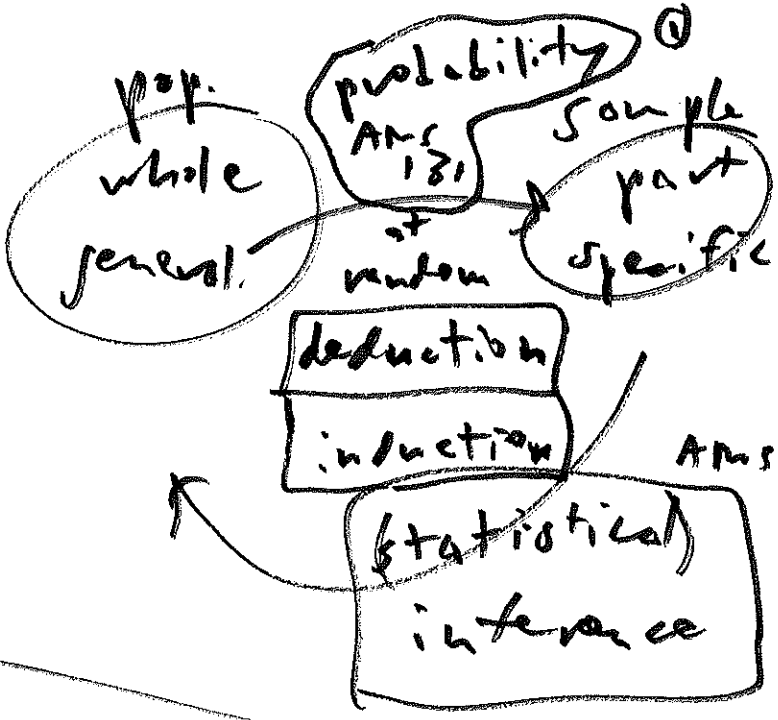
Disc. Sec. week 9

AMS 131
29 Aug 19



① ②

X_i = weight of person i in sample

$$S = \sum_{i=1}^{n} X_i$$

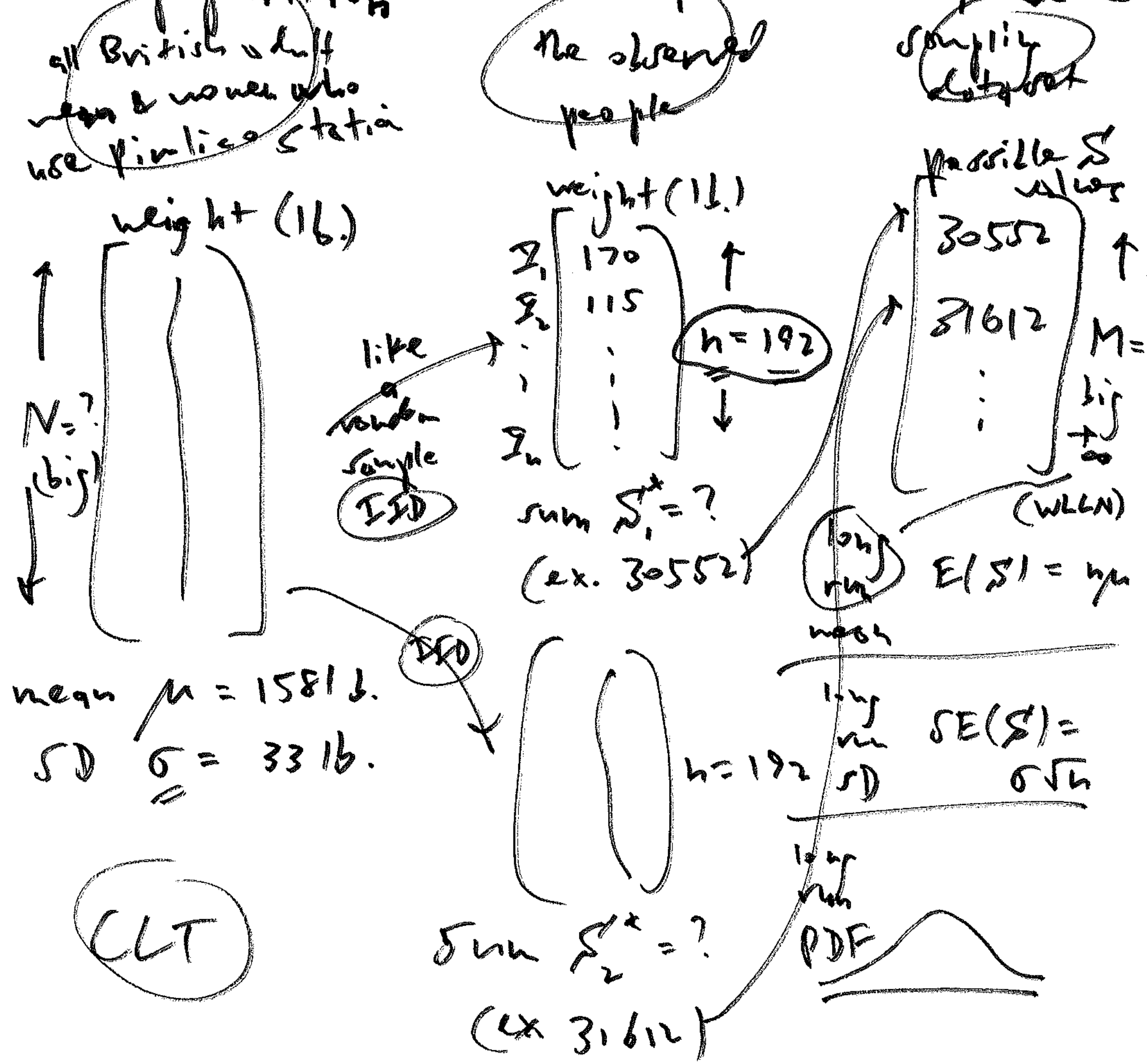
$$\mu = E(X_i)$$

$$\sigma = SD(X_i) = \sqrt{V(X_i)}$$

$P(\text{overload}) =$

$P(S > 31400) = ?$

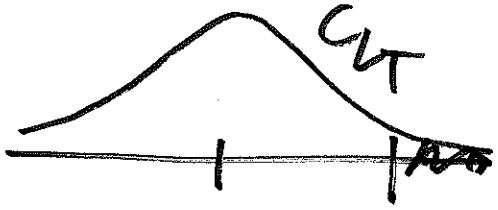
$$P\left(\sum_{i=1}^{n} X_i > 31400\right) = ?$$


population
all British adult men & women who use Pimlico station
sample
the observed people
repeated sampling dotplot
weight (lb.)
N = ? (big)
mean μ = 158 lb.
SD σ = 33 lb.
like a random sample
IID
weight (lb.)
X_1 170
X_2 115
X_n
n = 192
sum $S_1^* = ?$
(ex. 30552)
IID
n = 192
sum $S_2^* = ?$
(ex 31612)
possible S values
30552
31612
M = big → +∞
(WLLN)
long run mean
$E(S) = n\mu$
long run SD
$SE(S) = \sigma\sqrt{n}$
long run PDF
CLT

$$E(\bar{x}) = E\left(\frac{1}{n}\sum_{i=1}^{n} x_i\right) = \frac{1}{n}\sum_{i=1}^{n} E(x_i) = \frac{1}{n}\sum_{i=1}^{n} \mu = \frac{1}{n}\, n\mu = \mu$$

(192)(158 lb.)
= 30336 lb.

SD = SE = 457 lb.

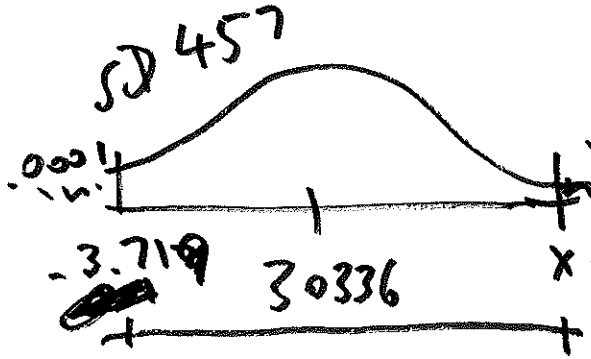


31400 lb. − 30336 lb.
457 lb.

$$V(\bar{x}) = V\left(\frac{1}{n}\sum_{i=1}^{n} x_i\right) \overset{\text{ID}}{=} \frac{1}{n^2}\sum_{i=1}^{n} V(x_i) = \frac{1}{n^2}\sum_{i=1}^{n} \sigma^2 = \frac{1}{n^2}\, n\sigma^2 = \frac{\sigma^2}{n}$$

$$SD(\bar{x}) = \sqrt{V(\bar{x})} = \frac{\sigma}{\sqrt{n}} = \text{standard error of } \bar{x}$$

$$= SE(\bar{x}) = SE_{\text{II}}(\bar{x}) = \frac{(3316.)}{\sqrt{192}} = 457 \text{ lb.}$$



32036
31400
~600