Discussion section, week of 5-9 Nov 2018

Discussion section 4, #(2), p. R-(56) → (57) (1)

AMS 7 5 Nov 18

prob. model

sample (1): the observed escalator riders, full trip weight (lb.)

imaginary data set (3): all possible values of S

pop. (2): all adult Londoners who use Pimlico station (*)

weight

N = ? (big)

like IID

Y_1 170
Y_2 115
⋮
Y_n

n = 192

sum S = ? (ex. 30,010)

hyp. IID

n = 192

sum S = ? (ex. 31,800)

⋮

30,010
31,800
⋮

M → ∞

long run mean — EV of S = 30,336 lb.

long run SD — SE of S = 457 lb.

pop. mean μ = 158 lb.

pop. SD σ = 33 lb.

pop. hist.

(**) long run hist.

P(escalator breaks on any single fully-loaded trip) = $P(S > 31{,}400 \text{ lb.})$

the world		the model
the total weight of all 192 people on escalator at rush hour	is like	the sum of $n = 192$ IID draws from population ⊛

expected value of S = EV of S

$$= \boxed{E_{IID}(S) = n\mu} = (\#\text{ draws})(\text{pop. mean})$$

$$= (192)(158 \text{ lb.}) = 30{,}336 \text{ lb.}$$

(standard error of S) = (SE of S) $= SE_{IID}(S) = \sigma\sqrt{n}$

$$= (33 \text{ lb.})\sqrt{192} \approx 457 \text{ lb.}$$

SE 457 lb.

EV

$\approx 0.99\% \approx 1\%$

$$\frac{31{,}400 \text{ lb.} - 30{,}336 \text{ lb.}}{457 \text{ lb.}}$$

CLT (Central Limit Theorem) L-124

P(failure) ≈ 1% = $\frac{1}{100}$

so fully loaded trips/day → expect to fail about once a day (!)

(c) Are there any observations you would change or set aside in sensibly analyzing this data set?