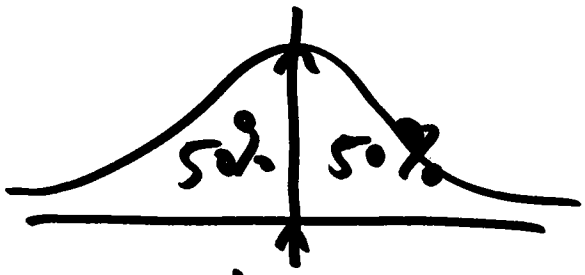
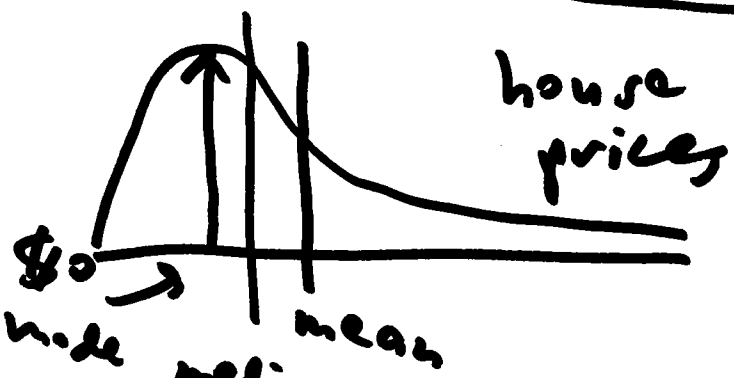
this time:	normal curve, experimental design	Thu ① 7 Apr
next time:	design, sampling	read: (1-5) DD ch. 6 FPP ch. 2, 19 (3-5, 1)

backup lecture notes: DD



pt. of symmetry = mean = median = mode



median stays same

median less sensitive to outliers & heavy tails than mean

more robust measure of center

SD (standard deviation) = measure of spread

$$s = \sqrt{\frac{(y_1 - \bar{y})^2 + \dots + (y_n - \bar{y})^2}{n-1}}$$

---

graphical interpretation of SD

empirical rule

IF you start at mean, go $\begin{pmatrix} 1 \\ 2 \\ 3 \end{pmatrix}$ SD either way,

you will usually capture (about $\begin{pmatrix} 2/3 \\ \text{most} \\ \text{almost all} \end{pmatrix}$ ($\begin{pmatrix} 68\% \\ 95\% \\ 99.7\% \end{pmatrix}$) of the data,

no matter what hist. looks like

height

69 in

64 in

$n = 5738$

Q: What # of these soldiers were over 6 ft. tall?

A₁ (exact) $\left(\frac{138}{5738}\right) \cdot 100\% = 2.4\%$

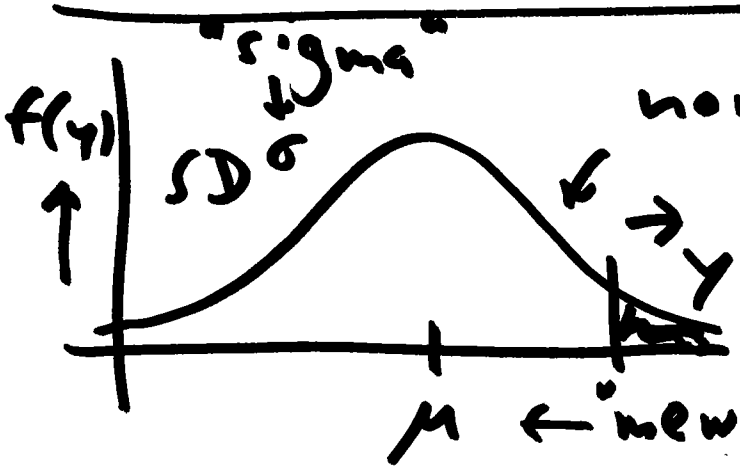
mean $\bar{y} = 67$ in

SD $s = 2.5$ in

A₂: area under hist. to right of 72 in = 2.4%

A₃: area under curve that approx. (approximate) the histogram

---



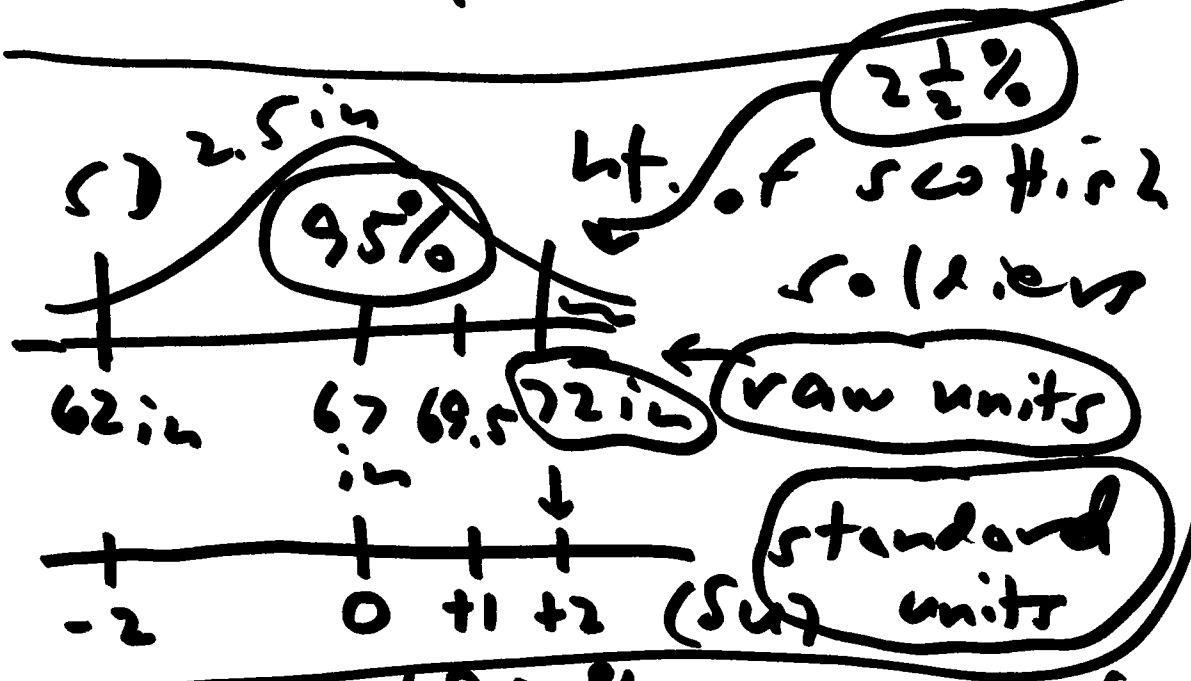
normal curve

(normal distribution)

(Gaussian dist.)

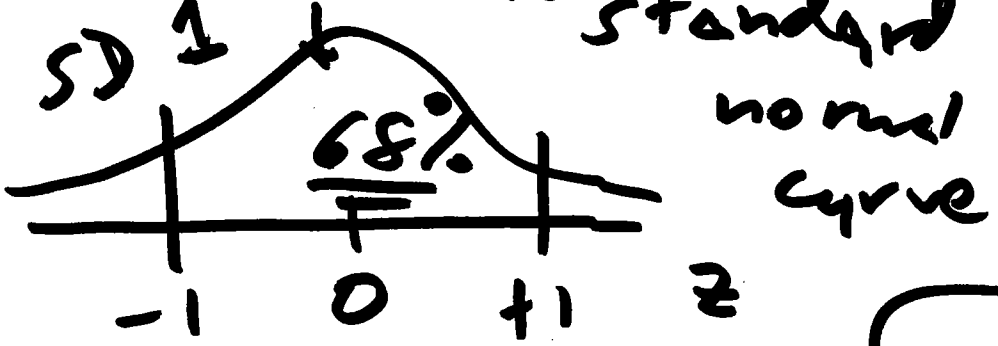
(1809) C.F. Gauss

$$f(y) = \frac{1}{\sigma\sqrt{2\pi}} e^{-\frac{1}{2\sigma^2}(y-\mu)^2}$$

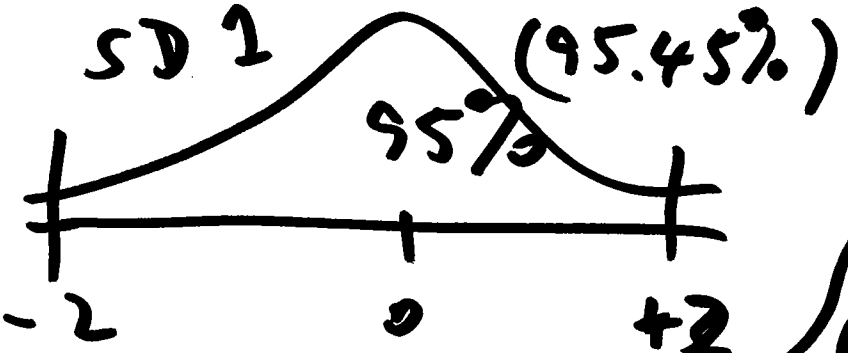


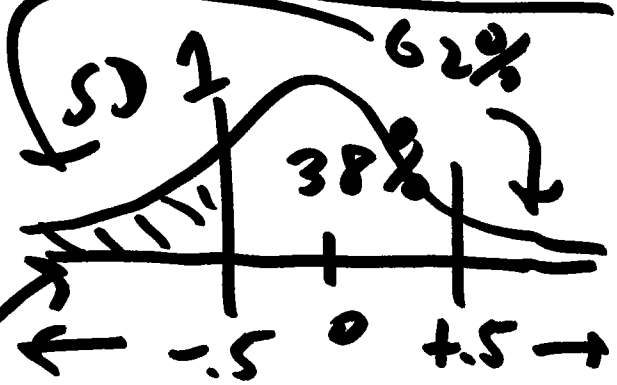
remark. a2k fact:

Every normal curve satisfies the empirical rule exactly.



standard normal curve





31%

① total area under curve is 100%

② normal curve symmetric