this time : normal curve

next time : experimental design

* HW 1 due this Fri @ canvas by 11:59 pm

AMS 7
17 Apr 18

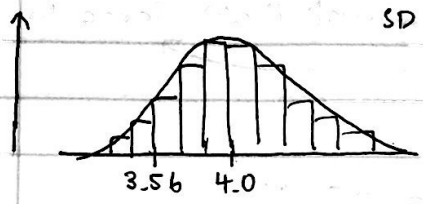
Q: What % of butterflies had wing length = 3.56 cm?

A_1 (exact): from raw data $= \frac{2}{24} = \frac{1}{12} = 8.3\%$

A_2 (approx) : draw histogram on density scale, work out area under histogram bars to left of 3.56 cm

A_3 (approx) :

density scale



$\begin{bmatrix} 12 \\ 12 \\ \vdots \\ 12 \end{bmatrix}$ mean = 12, SD = 0

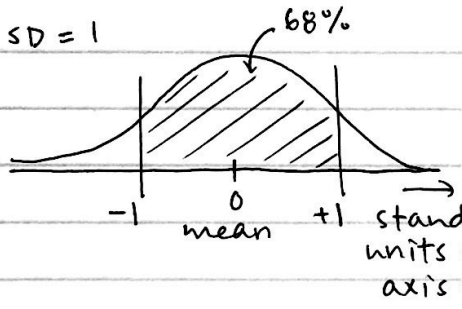
$\begin{bmatrix} c \\ c \\ \vdots \\ c \end{bmatrix}$ mean = c, SD = 0

SD ≥ 0 can't be negative

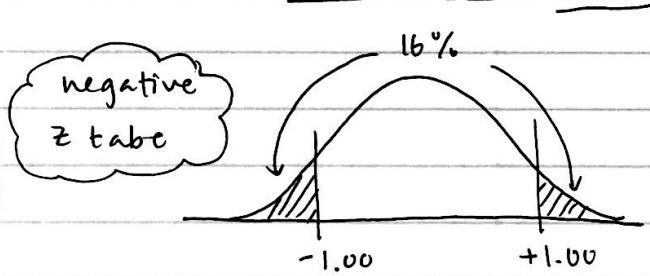
$-\infty < \bar{y} < \infty$

standard normal curve

SD = 1



* math fact : all normal curves satisfy the empirical rule exactly

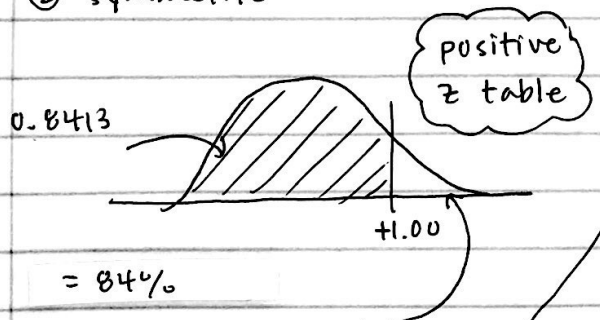


0.1587 = 15.9% ≈ 16%

2 facts about normal curve

① area under curve = 1 = 100%

② symmetric

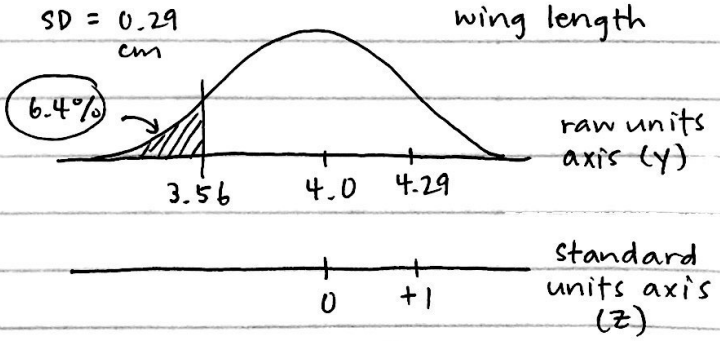


= 84%

100 - 84 = 16 %

SD = 0.29 cm

wing length



converting to standard units : $z = \frac{y_i - \bar{y}}{s} = \frac{3.56\text{ cm} - 4.0\text{ cm}}{0.29\text{ cm}}$

$= -1.52 \rightarrow 6.4\%$

to get from raw units (y) to standard units (z) :

$z = \frac{y - \bar{y}}{s} = \frac{\# - \text{mean}}{SD}$

z to y :

$y = \bar{y} + s \cdot z$

R - (41) → R - (50)
recommended reading

L - (67)

Ch.2 Experimental Design

* can't experiment on people ↳ ethics

$\overline{Y}$: brain anatomy (outcome) (weight of cortex in mg) (quantitative)

$\overline{X}$: psychological environment (treatment)

- can run survey : ask people about $\widehat{X}$, do brain scan to see their $\overline{Y}$

subjects : rats

- (T) treatment : enriched
- (C) control : deprived

Q: Does 603 differ from 647 by an amount that's large in practical terms? (practically signficant) (practsig)

A_1 : get expert information

$$A_2 = \frac{603\text{ mg} - 647\text{ mg}}{647\text{ mg}} = \frac{+36\text{ mg}}{647\text{ mg}} = +5.6\%$$