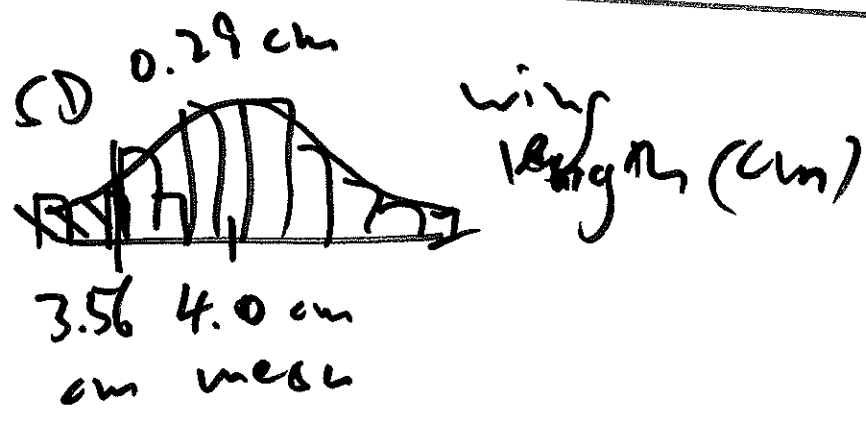


this time: normal curve;  
 next time: experimental design

read: DD A ch 1-3  
 DD: B ch. 1-6  
 LN pp. 1-54  
 AMS 7<sup>th</sup> 110 et 18  
 today: LN pp. 30 + 71

homework 1 due

by 11.59 pm next wed 17 oct 18



Q:  
 what % of butterfly in data set had wing length  $\leq 3.56$  cm?

exact  
 $A_1: 2/24 = 8.3\%$

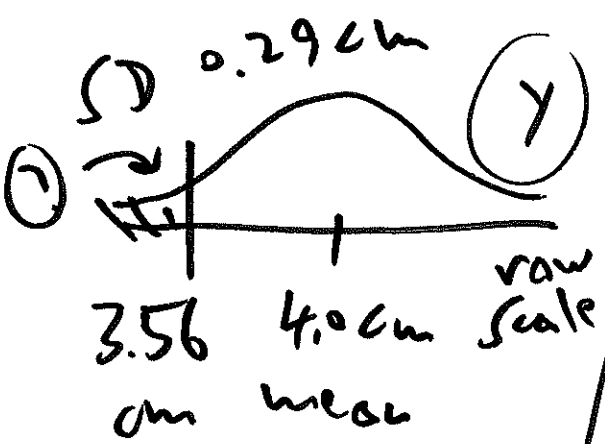
exact  
 $A_2:$   
 area of relevant hist. bars : 8.3%

approx  
 $A_3:$   
 $f(y) = \frac{1}{\sigma\sqrt{2\pi}} \exp\left(-\frac{(y-\bar{y})^2}{2\sigma^2}\right)$

SD  $\sigma$   
 $\bar{y}$   
 $y \rightarrow$

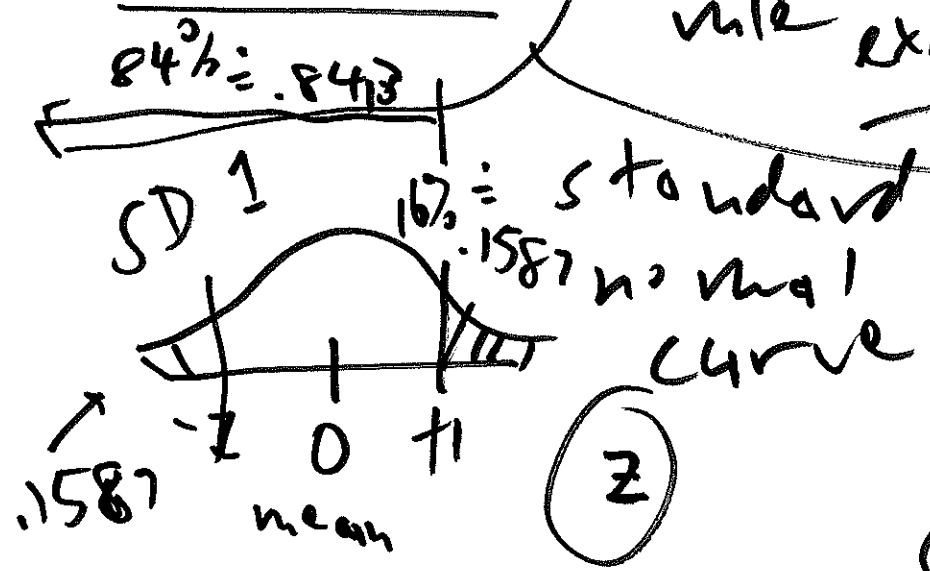
~~analytic~~  
 numerical integration

2



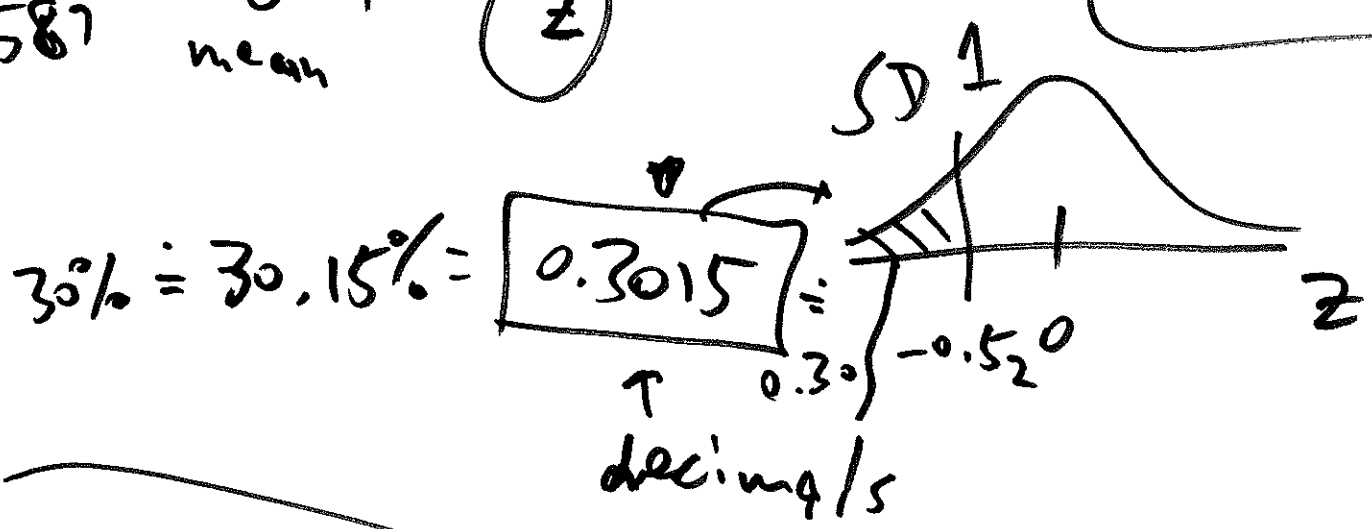
fact: all normal curves satisfy the empirical rule exactly

42  
 42  
 :  
 42  
 mean 42  
 SD 0



any # c  
 mean c  
 SD 0

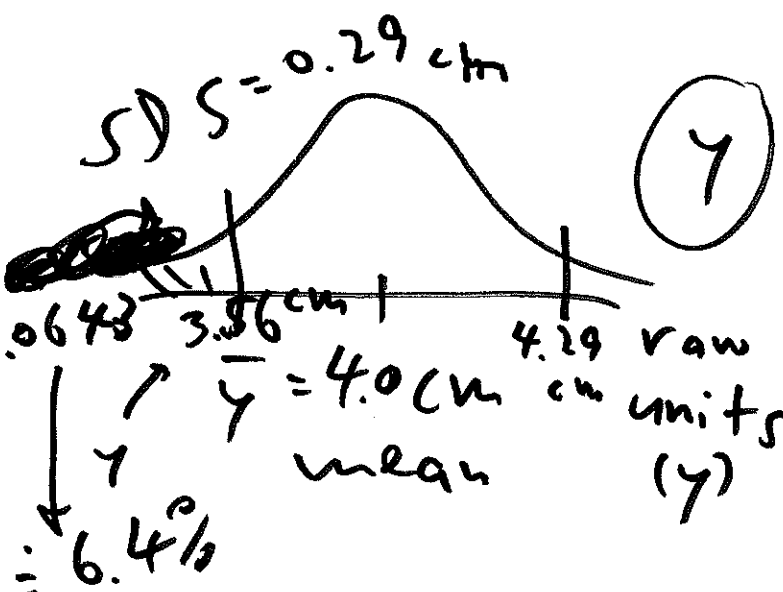
z



2 basic facts

about normal curves:

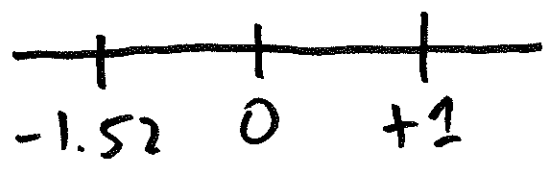
- 1 they're symmetric
- 2 total area = 1 = 100%



(7)

wing length (cm)

this is the normal approximation to a hist. (3)



standard units (z) (SU)

pure #s without units

$$\frac{3.56 \text{ cm} - 4.0 \text{ cm}}{0.29 \text{ cm}}$$

=

$$\frac{y - \bar{y}}{s} = z$$

$$\frac{\# - \text{mean}}{SD}$$

$$-1.52 = \frac{-0.44}{0.29}$$

Conversion to standard units (SU)

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

LN pp. (36) → (66) additional notes (4)  
(document camera notes) 12.26

exp. designs

cause → effect

most valuable form of causality

if let hammer go → it always falls

deterministic causality

probabilistic cause

effect

def. two var.  $X$  &  $Y$  are associated if, when one goes ↑, the other tends to go up or down on average

smoke 2 packs/day from 18 til dead → prob. of dying from heart disease ↑ dramatically

this is an association between  $X$  <sup>②</sup>  
and  $Y$ , but association  $\neq$  causation

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