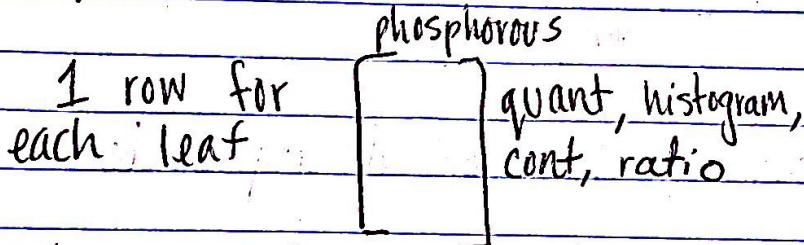


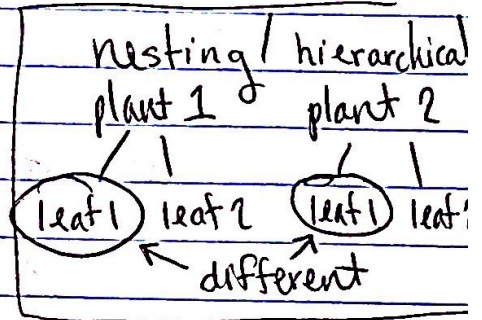
1. sort data smallest to largest
2. make raw frequency table
3. figure out how many bars/groupings work for that data set

Figure 1.5 (bars need to touch) - (L-20)

(L-21)

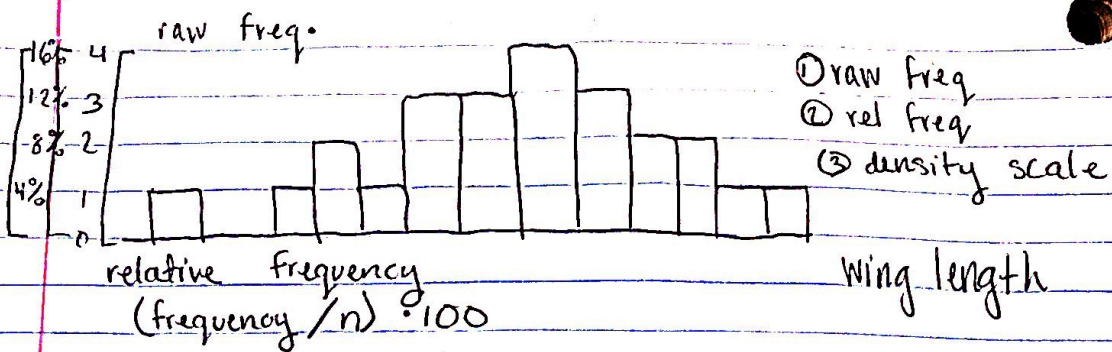


\* histogram intervals include left-hand point



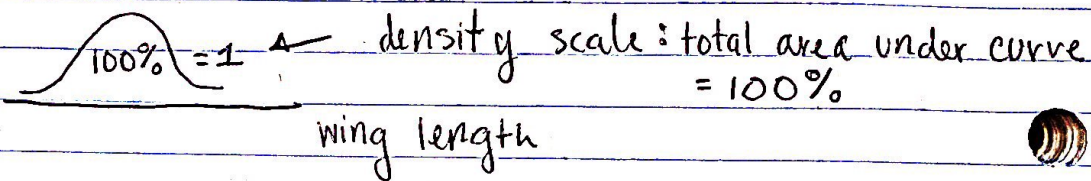
## Histogram Complexity

1. horizontal scale: right # of bars
2. vertical scale: 3 types of hist. by vertical scale

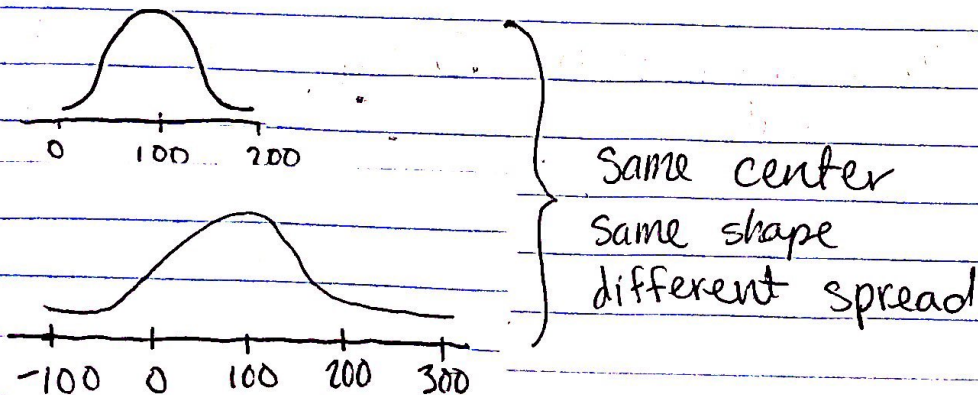
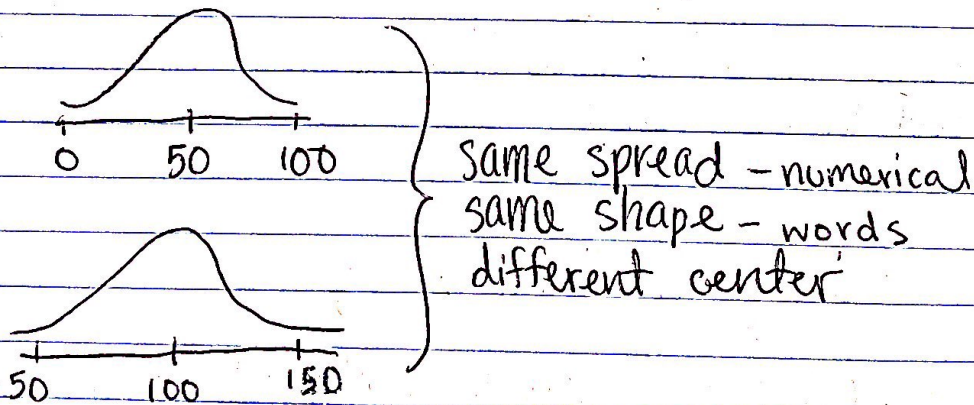


relative frequency

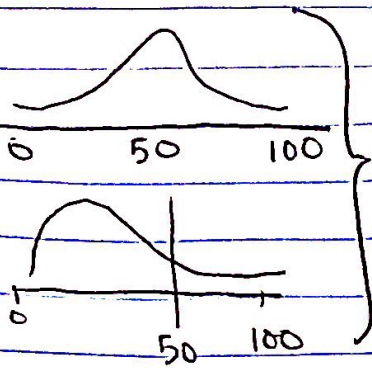
↳ when hist. is drawn on density scale, rel freq. (%) is portrayed with area under hist.



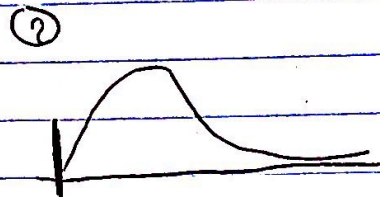
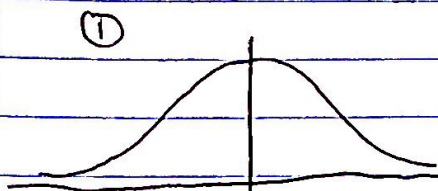
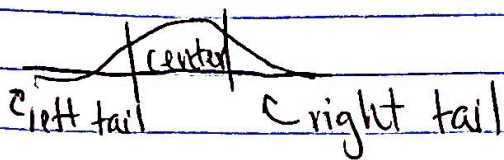
convention: all hist. on density scale







same center  
 same spread  
 different shape



long right hand tail

point of symmetry

asymmetric skewed

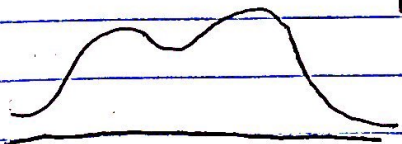
③



long left hand tail

barrier

④



bimodal / multimode

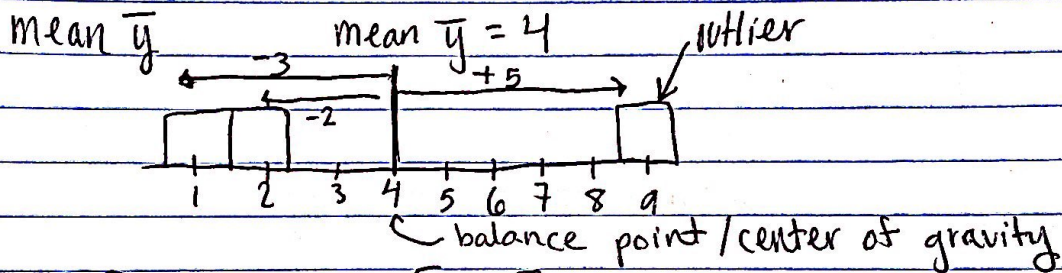
(L-22)

\* R-22 Formula Sheet

wing length  
 $n=24$   $y_1 \begin{bmatrix} 4.4 \\ 3.6 \\ \vdots \\ 3.9 \end{bmatrix}$  1 row for each butterfly

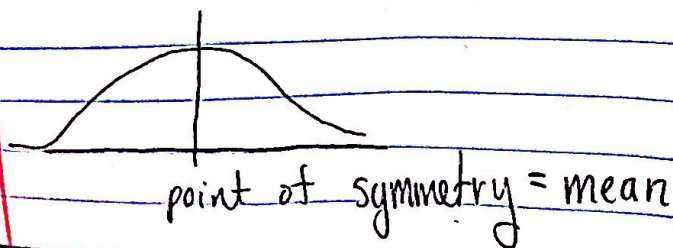
$$\text{mean } \bar{y} = \frac{1}{n} \sum_{i=1}^n y_i = 3.96 \text{ cm}$$

$\begin{bmatrix} y_1 \\ \vdots \\ y_n \end{bmatrix}$   $\uparrow$   $n$   $\downarrow$   $\begin{bmatrix} y \\ 1 \\ 2 \\ \vdots \\ n \end{bmatrix}$   $n=3$

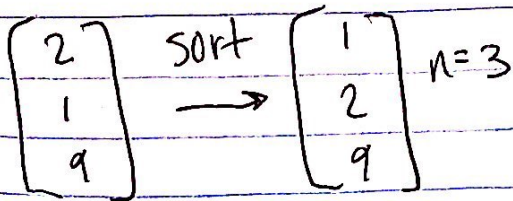


$\begin{bmatrix} 1 \\ 2 \\ 9 \end{bmatrix}$   $\xrightarrow{\text{subtract 4}}$   $\begin{bmatrix} -3 \\ -2 \\ 5 \end{bmatrix}$  mean = 0  
mean 4 deviations from mean

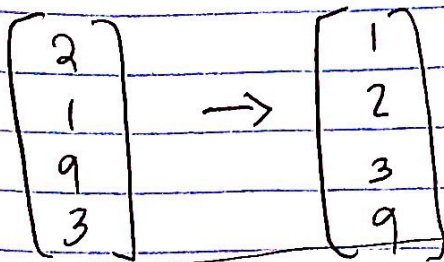
$\begin{bmatrix} y_1 \\ \vdots \\ y_n \end{bmatrix}$   $\xrightarrow[\bar{y}]{\text{subtract}}$   $\begin{bmatrix} y_1 - \bar{y} \\ \vdots \\ y_n - \bar{y} \end{bmatrix}$   
mean  $\bar{y}$  mean  $\frac{1}{n} \sum_{i=1}^n (y_i - \bar{y}) = 0$



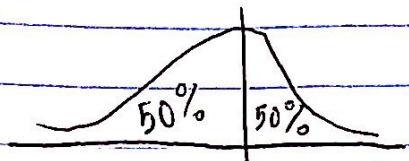




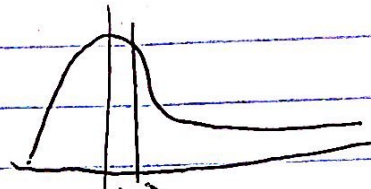
median = 2  
 mean = 4



median 2.5

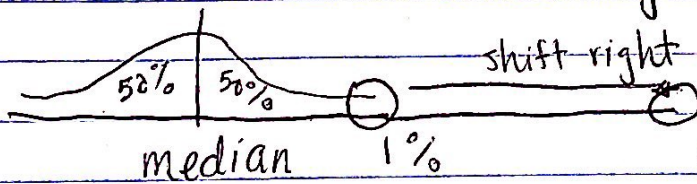


point of symmetry  
 = mean  
 = median  
 = mode

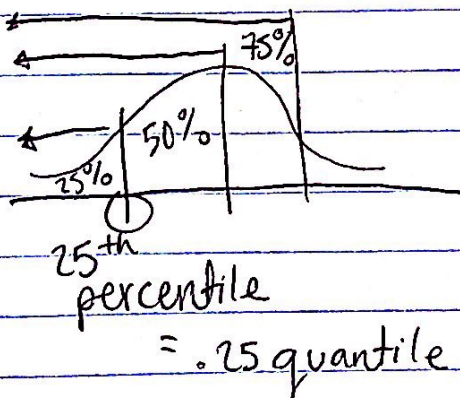


median = 50/50 point in  
 area under curve

### Stock market gains/losses



$\rightarrow$  median stays the same  
 $\rightarrow$  mean shifts



$(75^{\text{th}} - 25^{\text{th}}) = \text{spread}$   
 $= \text{inter-quartile range}$