

## Measures of Position

### I. Quartiles:

Example: The tuition costs, in thousands of dollars, for 25 liberal arts colleges are listed. Find the first, second, and third quartiles.

23 25 30 32 20 22 21 15 25 24 30 25 30  
20 23 29 20 19 22 23 29 23 28 22 28

### II. Interquartile Range (IQR)

Example: Find the interquartile range for the tuition costs data.

### III. Box-and-whisker plot

Five number summary

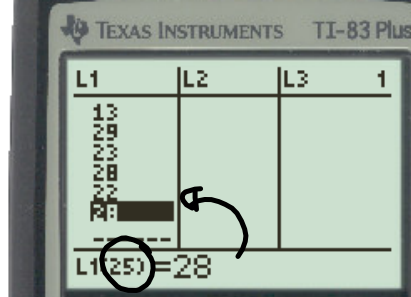
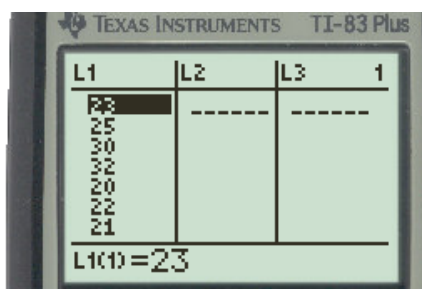
Draw a box-and-whisker plot for the tuition costs data.

### IV. Percentiles

What does it mean to say the weight of a six-month-old infant is at the 78<sup>th</sup> percentile?

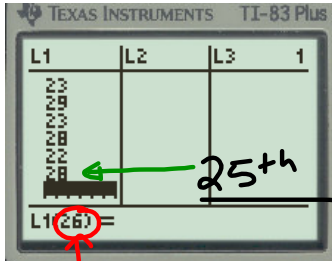
Example: The tuition costs, in thousands of dollars, for 25 liberal arts colleges are listed. Find the first, second, and third quartiles.

~~25~~ ~~25~~ ~~30~~ 32 20 22 21 15 25 24 30 25 30  
 20 23 29 20 19 22 23 29 23 28 22 28

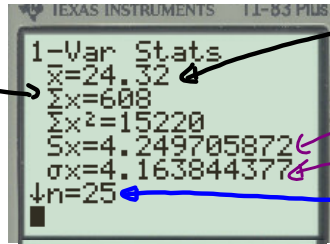


Example: The tuition costs, in thousands of dollars, for 25 liberal arts colleges are listed. Find the first, second, and third quartiles.

23 25 30 32 20 22 21 15 25 24 30 25 30  
 20 23 29 20 19 22 23 29 23 28 22 28



add all terms



" $\bar{x}$ " is the mean

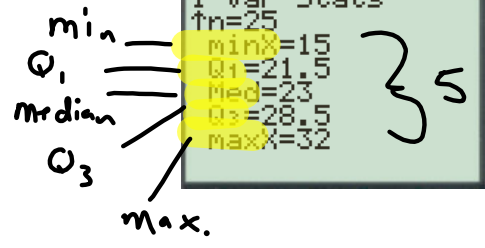
sample s.d.

population s.d.

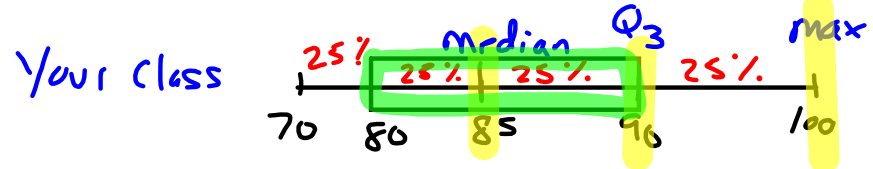
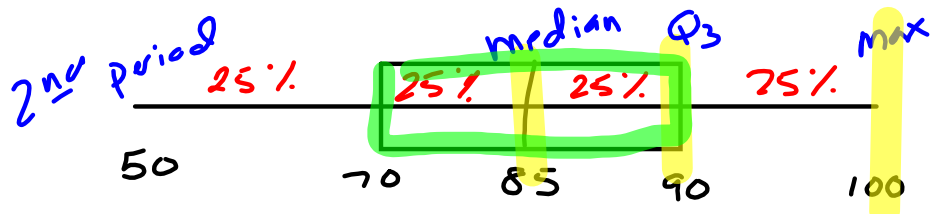
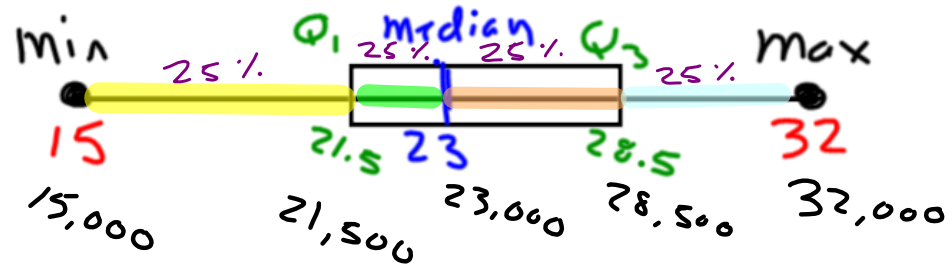
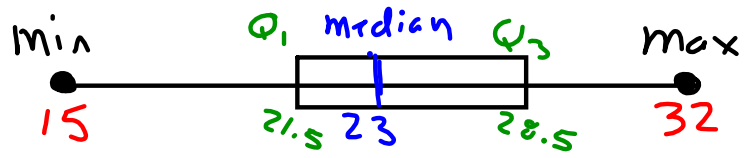
# of data values

25<sup>th</sup> term

26<sup>th</sup> term

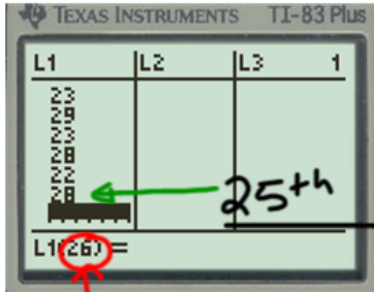


5 number summary

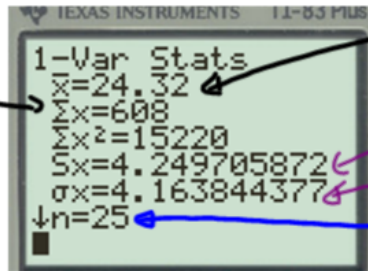


Example: The tuition costs, in thousands of dollars, for 25 liberal arts colleges are listed. Find the first, second, and third quartiles.

23 25 30 32 20 22 21 15 25 24 30 25 30  
 20 23 29 20 19 22 23 29 23 28 22 28



add all terms



" $\bar{x}$ " is the mean

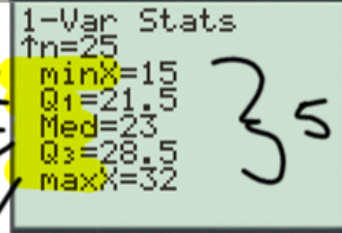
sample s.d.

population s.d.

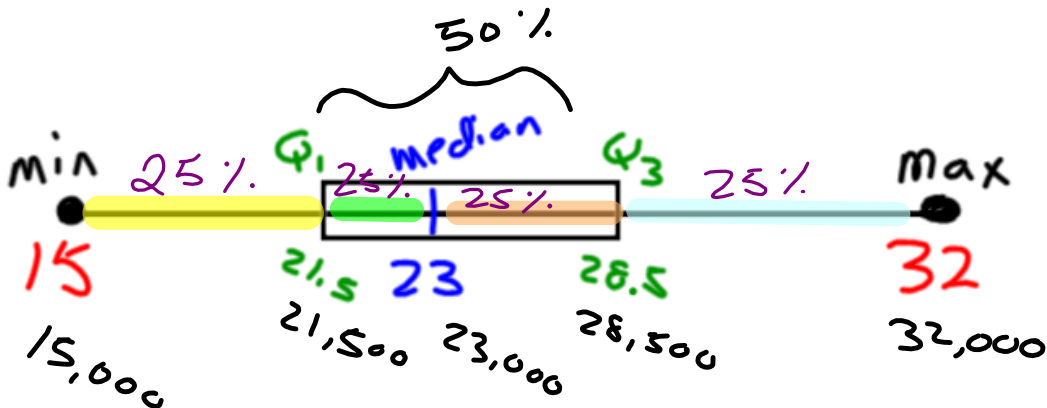
# of data values

26<sup>th</sup> term

min  
 $Q_1$   
 median  
 $Q_3$   
 max.



} 5 number summary



$28,500 - 21,500$

IQR

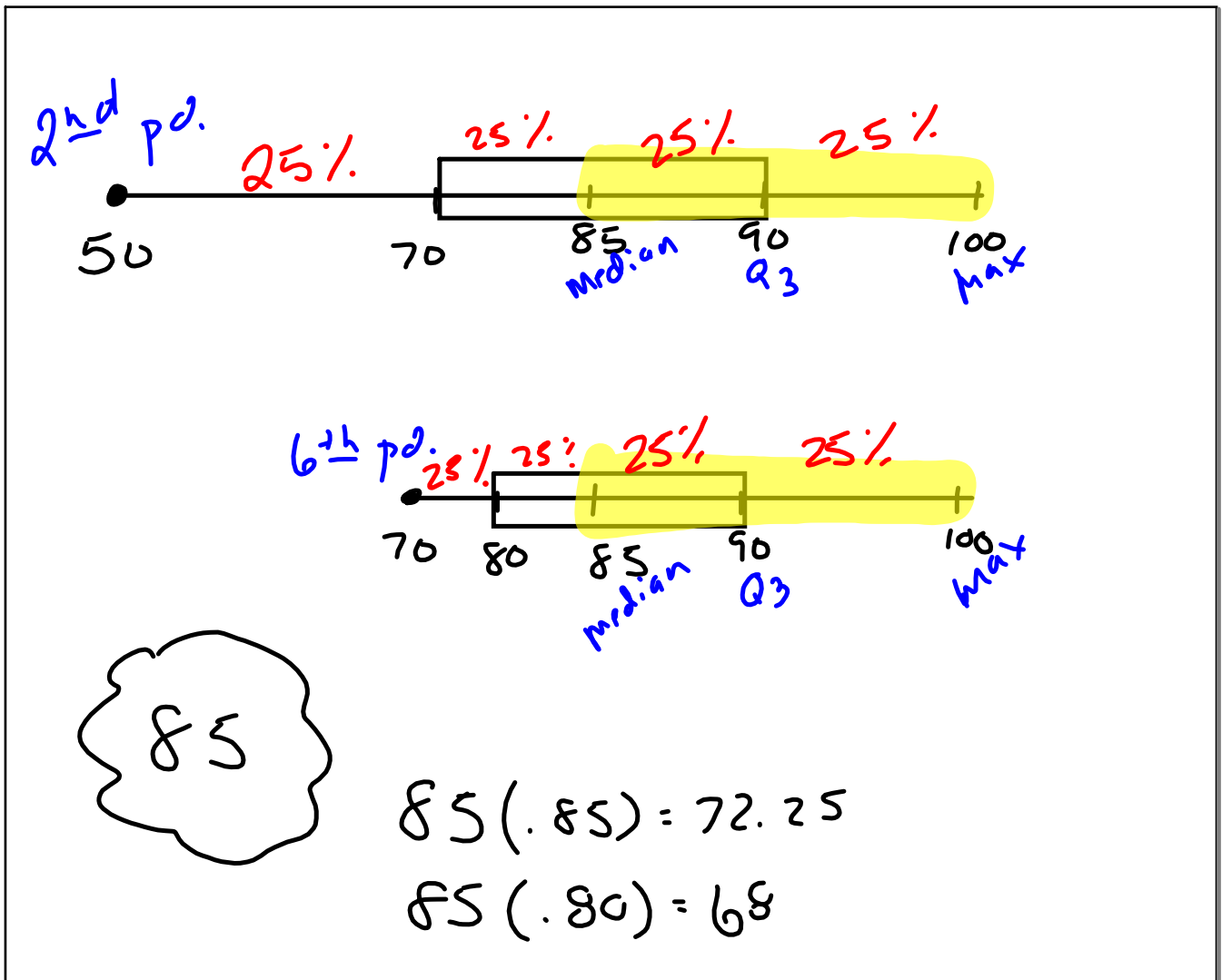
$IQR = 7,000$

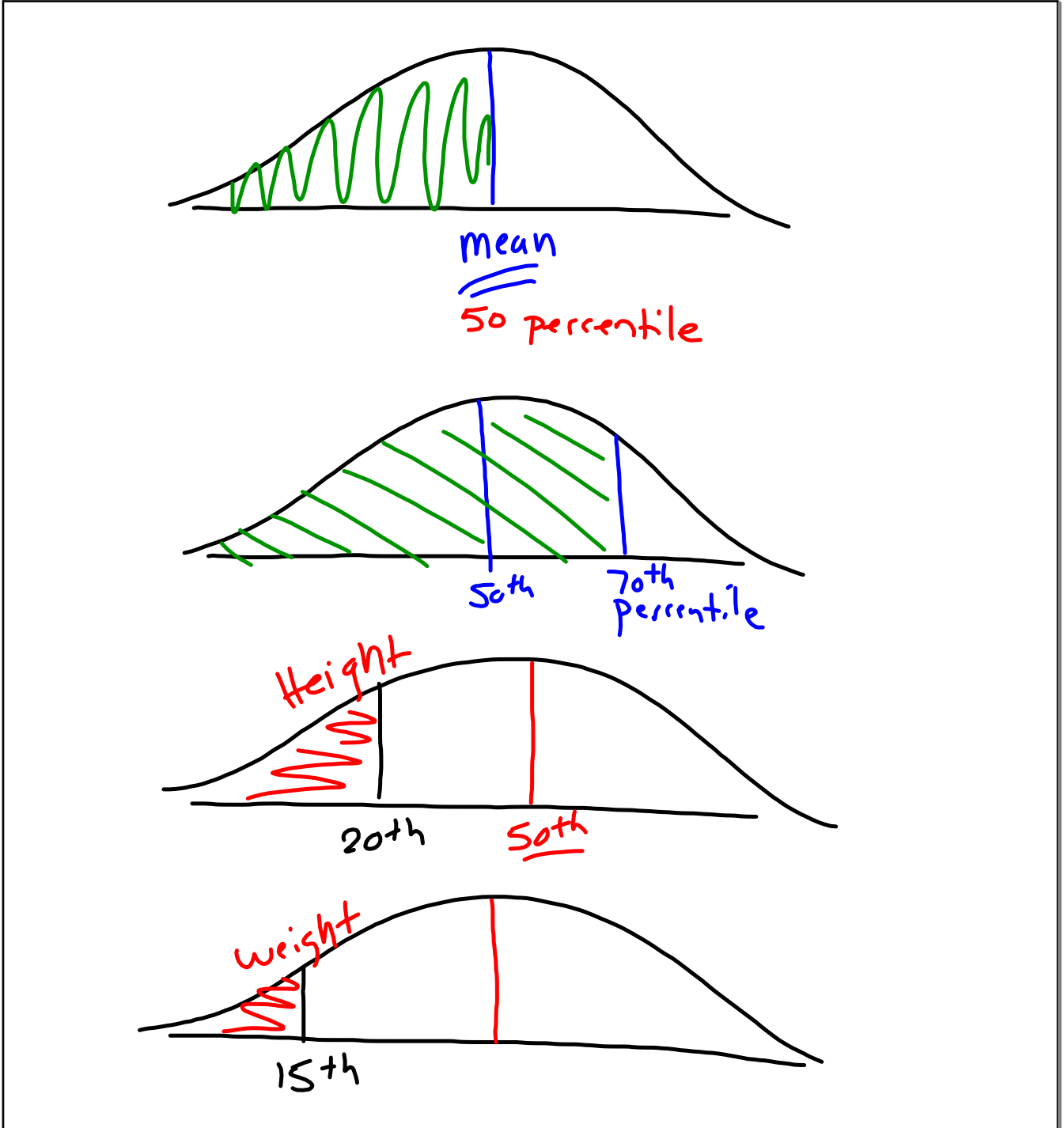
interquartile Range

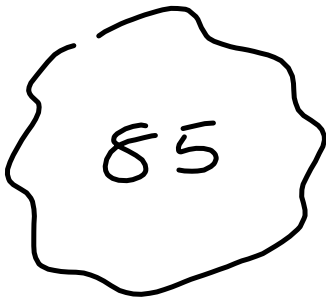
$Q_1$  and  $Q_3$

big-small

$Q_3 - Q_1$



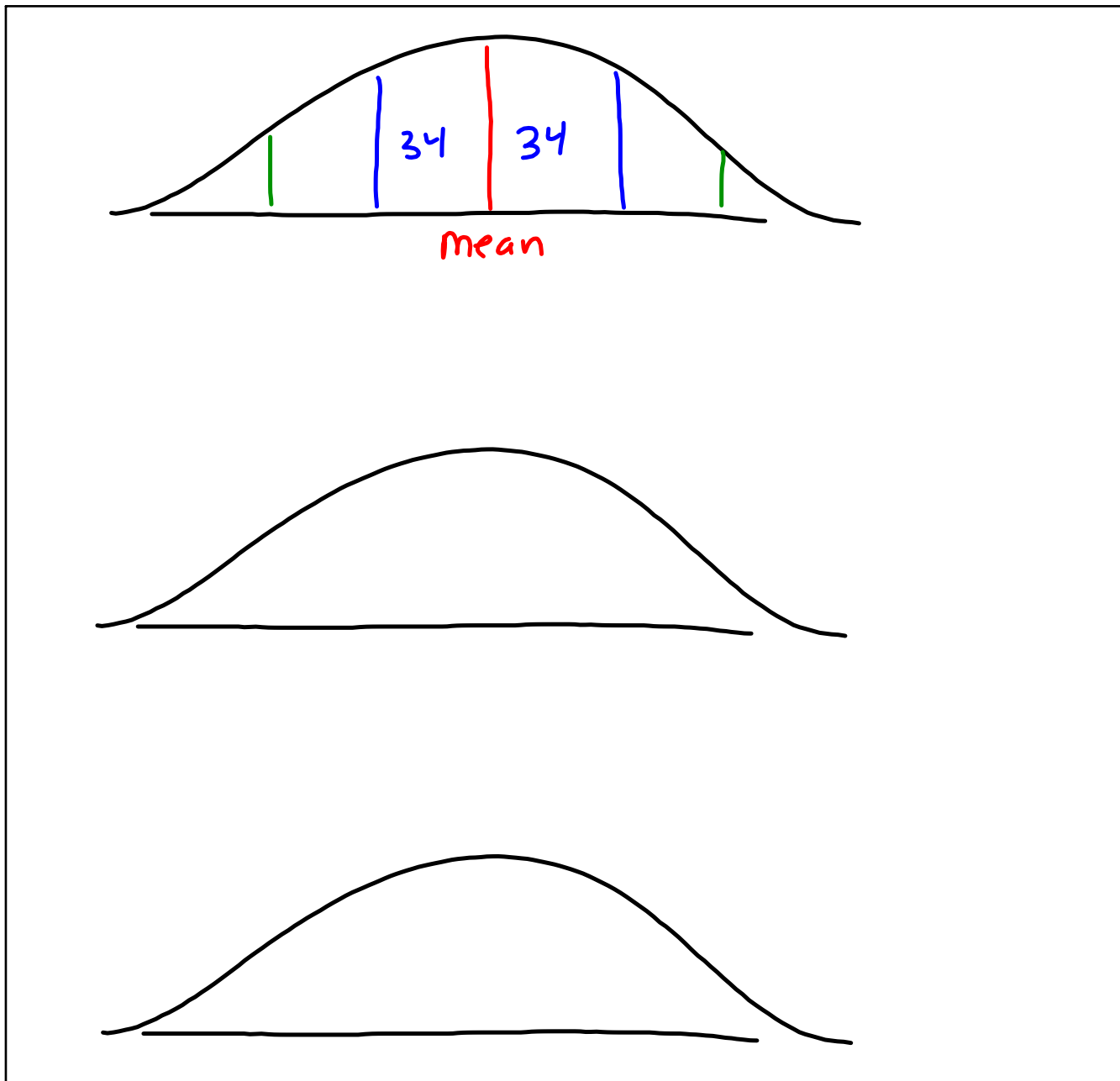




85

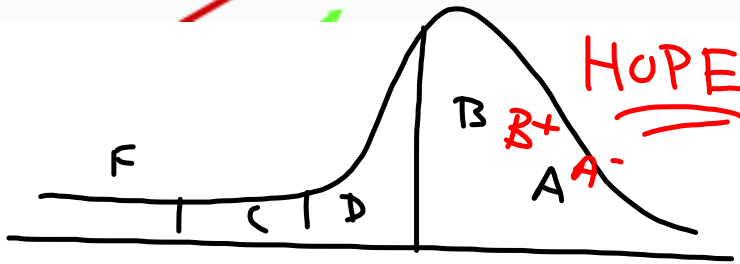
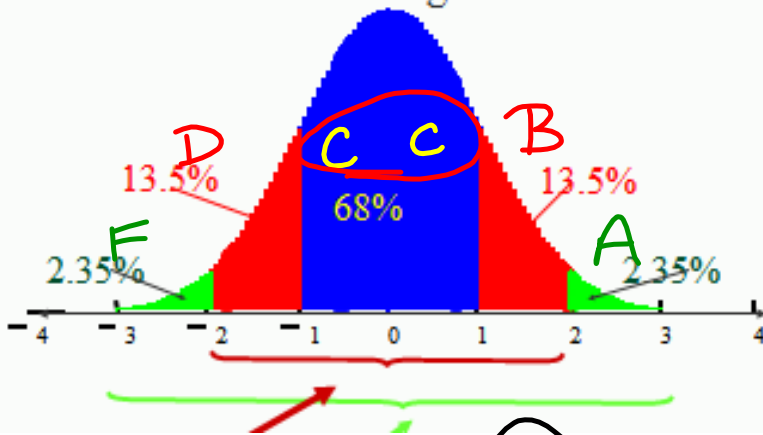
$$85 (85\%) = 72.25$$

$$85 (80\%) = 68$$





Data with **symmetric bell-shaped** distribution has the following characteristics.



50%  
Fail out  
of college  
after the  
1<sup>st</sup> year.

**I. Quartiles:**

Example: The tuition costs, in thousands of dollars, for 25 liberal arts colleges are listed. Find the first, second, and third quartiles.

23 25 30 32 20 22 21 15 25 24 30 25 30  
 20 23 29 20 19 22 23 29 23 28 22 28

```
1-Var Stats
x̄=24.32
Σx=608
Σx²=15220
sx=4.249705872
σx=4.163844377
n=25
```

mean " $\bar{x}$ "

sample s.d.  
 population s.d.

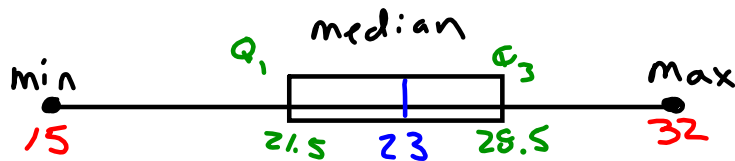
```
1-Var Stats
n=25
minX=15
Q1=21.5
Med=23
Q3=28.5
maxX=32
```

# of data values

min

median

max



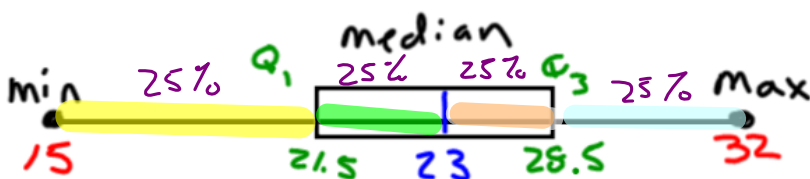
$IQR = 7$

"inter quartile range"

$Q_1 + Q_3$  big-small

$IQR \Rightarrow Q_3 - Q_1$

$28.5 - 21.5 = 7$



Percentiles :

