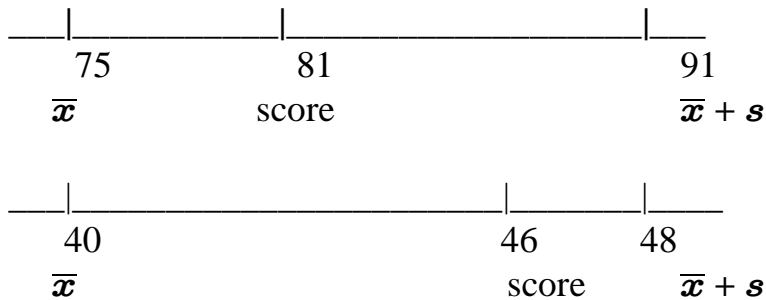


3.4 MEASURES OF RELATIVE STANDING

z — SCORES (or STANDARD SCORE)

Is the number of standard deviations that a given value x is above or below the mean.

*** If you score 81 on your first exam, where $\bar{x} = 75$ and $s = 16$, and you score 46 on your second exam, where $\bar{x} = 40$ and $s = 8$, which score is relatively better?



– z -scores enable us to standardize values so that they can be compared

$$\text{Sample } z = \frac{x - \bar{x}}{s} \quad \text{Population } z = \frac{x - \mu}{\sigma}$$

(round z to 2 decimal places)

***find the z -scores on the problem given above.

*** do problem #6 a, b, c, on page 127

– z -scores can be used to differentiate between ordinary values and unusual values
Values with z -scores within ± 2 are "ordinary" or "usual"
Values with z -scores greater than 2, or less than -2 , are "unusual"
(*diagram pg 115*)

*** do problem #6 d, on page 127

QUARTILES AND PERCENTILES

Q_1, Q_2, Q_3

Quartiles – Divide **ranked** data into 4 equal parts

$P_1, P_2, P_3, P_4, \dots, P_{99}$

Percentiles – Divide **ranked** data into 100 parts

A score in the 88th Percentile means: Student's score is higher than 88% of the scores

Finding the percentile corresponding to a particular score x

$$\text{Percentile} = \frac{\text{number of scores less than } x}{\text{Total number of scores}} \times 100$$

*****From the movie budget in table 3-4 (page 116):**

Find the percentile corresponding to a movie budget of 35 million \$

Find the percentile corresponding to a budget of 68 million \$

REVERSE — Finding the score corresponding to a particular percentile

What scores is at k percentile?

(1) Rank the data from lowest to highest

(2) Find $k\%$ of the total number = L (Locator)

a) If L is not a whole number, **round up** and find the score in that position

b) If L is a whole #, find the average of the scores in positions L and $L+1$

*****Using the data in table 3-4 (page 116),**

Find each one of the following:

$P_{40} =$

$Q_1 =$

$Q_3 =$

A statistic that we will use in the next section is defined in terms of quartiles. It is the Interquartile Range, or **IQR, for short:**

$$\text{IQR} = Q_3 - Q_1$$

What is the IQR for the best actress ages in table 3-4?

Now we will sketch a boxplot with the data in 3-4. First we need a five number summary.

Min	
Q₁	
Median	
Q₃	
Max	

A modified boxplot uses an asterisk or a point to show outliers.
 An outlier is a point that is

$1.5 \times \text{IQR}$ less than Q_1 or
 $1.5 \times \text{IQR}$ greater than Q_3 .

Now we will sketch a modified boxplot using the the Cholesterol levels (mg) of 40 females:

264 181 267 384 98 62 126 89 531 130
 175 44 8 112 462 62 98 447 125 318
 325 600 237 173 309 94 280 254 123 596
 301 223 293 146 149 149 920 271 207 2

Min	
Q₁	
Median	
Q₃	
Max	