**FST NOTES 1-4**
TOPIC: Box Plots
**GOAL**
Examine distributions as a whole using box plots
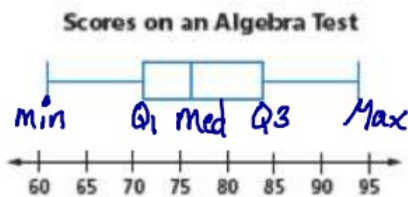
**Vocabulary**

box plot, box-and-whiskers plot

minimum

first (lower) quartile

second quartile

third (upper) quartile

maximum

five-number summary

interquartile range (IQR)

whiskers

outlier

**Label Parts of the Box Plot**

**Scores on an Algebra Test**



$$Range = Max - Min$$
$$IQR = Q3 - Q1$$

**Warm-Up**

In 1–4, think of the dots as representing numbers in order in a data set. For each set of dots, identify:

    a. the median dot;

    b. the median of the dots before the median;

    c. the median of the dots after the median.

(Place a vertical bar on a dot if it is the median. Place a vertical bar between dots if the median is between two dots.)

1. 

2. 

3. 

4. 

## Additional Examples

1. In 1998, the American Film Institute unveiled a list of the 100 Best American Movies of All Time as judged by 1500 members. Here are the top 25 with their years of first release.

   a. Give the five-number summary of these years.

   b. Draw the box plot.

2. Consider the data given in Example 1. Use the 1.5 × IQR criterion to determine if there are any outliers.

*(handwritten, left margin with arrow pointing to "five-number summary")*
Min
Q1
med
Q3
Max

| 1 | Citizen Kane | 1941 |
|---|---|---|
| 2 | Casablanca | 1942 |
| 3 | The Godfather | 1972 |
| 4 | Gone with the Wind | 1939 |
| 5 | Lawrence of Arabia | 1962 |
| 6 | The Wizard of Oz | 1939 |
| 7 | The Graduate | 1967 |
| 8 | On the Waterfront | 1954 |
| 9 | Schindler's List | 1993 |
| 10 | Singin' in the Rain | 1952 |
| 11 | It's a Wonderful Life | 1946 |
| 12 | Sunset Boulevard | 1950 |
| 13 | The Bridge on the River Kwai | 1957 |
| 14 | Some Like It Hot | 1959 |
| 15 | Star Wars | 1977 |
| 16 | All About Eve | 1950 |
| 17 | The African Queen | 1951 |
| 18 | Psycho | 1960 |
| 19 | Chinatown | 1974 |
| 20 | One Flew Over the Cuckoo's Nest | 1975 |
| 21 | The Grapes of Wrath | 1940 |
| 22 | 2001: A Space Odyssey | 1968 |
| 23 | The Maltese Falcon | 1941 |
| 24 | Raging Bull | 1980 |
| 25 | E.T. the Extra-Terrestrial | 1982 |

**We will use our calculator to answer the above questions.**
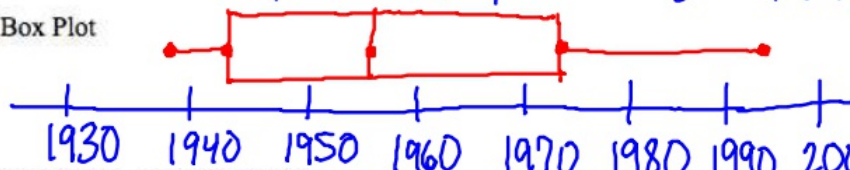
1) Enter the data        STAT 1: EDIT – L1        *enter years in L1*

2) Sort the data from smallest to largest        STAT 2: Sort A (L1)

3) Find 5-number summary    STAT → CALC 1: 1-Var Stats L1

Min $1939$    Q1 $1944$    Median $1957$    Q3 $1973$    Max $1993$

4) Draw Box Plot



*(handwritten number line below box plot)*
1930  1940  1950  1960  1970  1980  1990  2000

5) Find any outliers – extreme values
IQR – Interquartile range, Q3-Q1

Any number larger than Q3 + 1.5(IQR)
Or smaller than Q1 – 1.5(IQR)

*(handwritten)*
$IQR = 1973 - 1944 = 29$  IQR

$Q3 + 1.5(IQR)$        $Q1 - 1.5(IQR)$

$1973 + 1.5(29)$        $1944 - 1.5(29)$

#s above 2016.5    #s below 1900.5

**No outliers**

STAT #1
enter salary in L1

STAT → Calc #1
1-Var STATS L1 (2nd 1) enter
↓ 5-number summary

| No. | Job | Salary ($1000) |
|---|---|---|
| 1 | CEO | 380 |
| 2 | CEO Asst | 35 |
| 3 | VP | 150 |
| 4 | VP Asst | 30 |
| 5 | Parts Mgr | 90 |
| 6 | Parts Worker | 30 |
| 7 | Parts Worker | 30 |
| 8 | Custodian | 27 |
| 9 | Custodian | 24 |
| 10 | Custodian | 24 |
| 11 | Sales Mgr | 90 |
| 12 | Sales Rep | 65 |
| 13 | Sales Rep | 65 |
| 14 | Sales Rep | 65 |
| 15 | Sales Rep | 65 |

**Example:** For the salary data at the right, find
1) The 5-# summary
2) Are there any outliers
3) Create a box plot of the data

min = 24
Q1 = 30
Med = 65
Q3 = 90
max = 380

$$IQR = Q3 - Q1$$
$$90 - 30 = \boxed{60}$$

Outlier

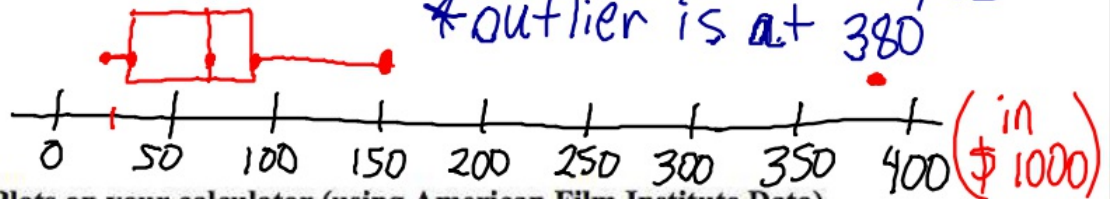$Q1 - 1.5(IQR)$     $Q3 + 1.5(IQR)$
$30 - 1.5(60)$      $90 + 1.5(60)$
$= -60$ ↓           $= 180$ ↑

\# below -60          \# above 180
NO                    Yes
*outlier is at 380

Modified
Box
plot



0   50   100   150   200   250   300   350   400 (in $1000)

**Box Plots on your calculator (using American Film Institute Data)**

Graph Box Plot

2ND Y= (STAT PLOTS) 1: PLOT 1
ON, TYPE, XLIST: L1

ZOOM-9: Zoom Stat