Steelers:2008 Super Bowl Champs
Using the TI-Nspire TouchPad with OS 2.0

ALEGRA II   TN   CLE 3103.5.1 CFU 3103.5.5 Calculate measures of central tendency & Spread
PRE CALCULUS
STATISTICS

Activity: Analysis of the 2008 Super Bowl Champs: Pittsburgh Steelers
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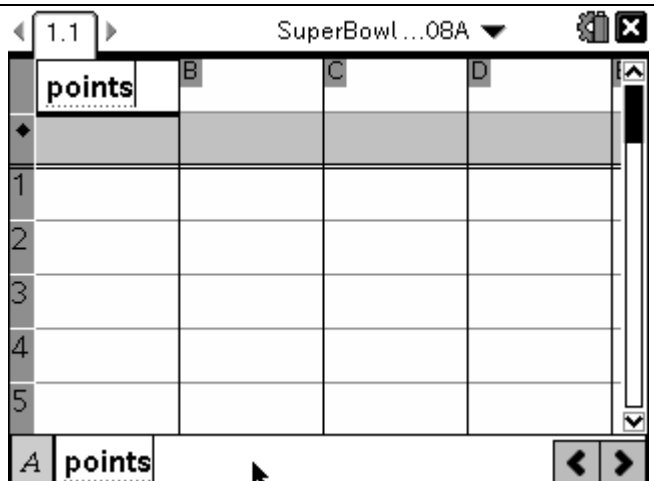
Teacher instructions. This activity can be modified to meet your specific needs.
Suggestions: **For Algebra I use page one, i.e. entering data making a dot plot and box plot.**
                    Algebra II, use pages one and two, i.e. same as above plus LSRL and residuals
                    PreCalculus, add page three, i.e. variance and standard deviation.
                    Statistics (AP & standard), Add page four, i.e. t score calculations. Other AP topics are
                    incorporated in activity and noted as (AP STATS.)
Notification: **This activity can be used with the Nspire ClickPad, but the keystrokes will differ.**
OPTIONS: You may want to remove the detailed instructions in the Student Worksheet, or use the
               activity for small group work.
Open the SuperBowl_Champs_2008.tns document

Insert the points scored per game in column A Type "points" in the title row of column A The points scored are automatically inserted.	

Add a Data & Statistics Page
        /~
        5: Add Data & Statistics
Make a Dot Plot
        Move cursor to bottom center until cursor changes to crosshairs
        .
        Select "points"
Describe the Dot Plot __Somewhat centered with the most of the dots in the middle.__
Make a Box Plot
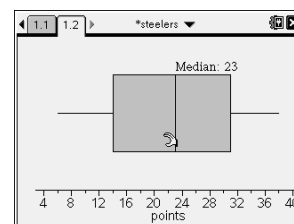   b
        1: Plot Type
        2: Box Plot

Is the Box Plot approximately symmetrical? Yes
What is the MEDIAN? 23
What can we tell about the MEAN? It is approximately 24. (AP Stats)
How do we know that? The data is approx. symmetric (AP Stats)
 Go back to the Data Page (/ then press left on touchpad)

Insert a Column BEFORE "points" column.

       Move the cursor up until the entire column is highlighted.

       b

       2: Insert

       3: Insert Column

       (esc)

Name the column "game"

Fill in the column with numbers from 1 to 19

       b 3: Data   1:Generate Sequence

       Enter in the wizard n,1,19,19 Click [OK]

Go to the Statistics Page (/ then press right on touchpad)

Change the x axis to game (Move cursor to bottom of screen until crosshairs appear, enter, select game.)

Make the y axis points   (Move cursor to left side of screen until crosshairs appear, enter, select points.)

Find the line of Best Fit. (menu, 4:Analyze, 6:Regression, 1:mx+b (Alg I) or 2:a+bx

       What is another name for this line? LSRL (Least Squares Regression Line)

       What is the equation of this line? y = 20.26 + .24x

       Did the Steelers scoring increase or decrease over time? increased

       Over all, how much did the scoring change per game? Approximately .24 points per game.

       What does the constant mean? The LSRL intersects the y axis at 20.26

       Does this really make sense? No Why or why not? You can't score without playing a game.

We want to determine the variability of the Steelers scoring.

       Go to the Data Page

       Name Column C "resids"

       Calculate the difference between the points per game and the mean

       Move cursor to cell below resids (grey box) and type "=points-mean(points)

What do you think that will look like? Rhetorical Question.

       Go to the Statistics Page

       Add a Residual graph
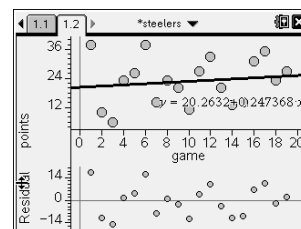
           b

           4: Analyze

           7: Residuals

           2: Show Residual Plot

       Describe do you see? A Random Pattern about the LSRL.

       What does this mean? A Linear Regression is a good procedure to use.

What is the sum of the residuals? Zero (0) Why? Definition of "Line of Best Fit."

       What would happen if we squared the residuals? All the results will be positive. The larger the distance from LSRL, the larger the square.

           Go to Data Page

           Name Column D "squares"

           Enter the square for the residuals

           HINT: In the grey box type =resids q·

What does squares of the residuals look like? Rhetorical Question.
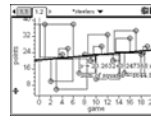   Add a Residual graph (to reduce clutter: menu,4:Analyze, 7:Residuals, 1: Show Residual squares.)
        b
        4: Analyze
        7: Residuals
        1: Show Residual squares
    Describe do you see? A square for each point, based on distance from LSRL.
    What does this mean? The size of the square shows how the variance for each point.

    Will the sum of the squares also equal zero? Why(not)? No, when squares are added, always
    get a positive, therefore the more points, the larger the sum will be (if not on the LSRL.)
What will the sum of the square of residuals be?? Rhetorical Question.
    Add a Calculator Page
        /
        ~
        1: Add Calculator ·
        Type sum(squares)
            .
Record your answer 1679.68

What would make the answer smaller? Move points closer to LSRL.

What would make the answer larger? Move points further away from LSRL or add points not on LSRL.

Do we want the sum of the squares to be large or small and why? Small, Points are close to the line,
therefore smaller residuals,
Simply adding more points will increase the sum of the squares.

How can we determine the average variability? Find the mean of the sum of the squares.

For census data (the whole population) we divide by n
For sample data(a proportion) n – 1
Let's use n-1 as we are using this year to make inference about all of the Steeler's Super Bowl years.

What is the Variance? 93.3

How did we overcome getting zero by adding the residuals? Squaring them.
To find the standard deviation, we need to "undo" the squaring, so take the square root of the
previous answer. 9.66 HINT: ctrl, x^2,ctrl,(-)

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In the 2008 Super Bowl, Cardinals by scored 23 points. Based on their history, what was the probability the Steelers will score 24 or more points in their next Super Bowl?

Conditions:
1. σ is unknown.
2. SRS assumed.
3. No extreme outlier (from box plot.)
4. Normally distributed, verified (not required.)

Identify the population of interest Points scored in Steeler's Super Bowl games

Parameter Mean points scored

Null and Alternative Hypothesis

$H_o: \upsilon = 23$

$H_a: \upsilon > 23$

Inference Procedure One Sample t test

Set up formula to find P(v)

$t = (24 – 22.7368)/(9.66/\sqrt{19})$

df = 18

t = .570

P(x) = .71

Conclusion: Make the connection to the population of interest in context.