Instructions for Using the Calculator for Statistics

Descriptive Statistics

Entering Data

General Statistics - mean, median, stdev, quartiles, etc

Five Number Summary

Box Plot with Outliers

Histogram

Distributions: Normal, Student-t

Area under a normal curve

Area under Student-t curve

Find z-score for a given area

Find t-score for a given area and df

Normal Probability Plot

Inferential Statistics

z- Interval

z-Test, 1 mean

t- Interval

t-Test, 1 mean

t-Test, pooled

t-Test, non-pooled

Paired-t Test

Chi-Square GOF

Chi-Sq Independence

Correlation t-Test

Statistics Home Page

Class Notes

Instructions for Using the Calculator for Statistics

Descriptive Statistics

Entering Data and Formulas into Lists

STAT / EDIT

1. Edit

Before entering data into any lists, clear the lists:

- Use the arrow-up key to move the cursor up into the heading
- While in the heading, click CLEAR / ENTER
  This should delete all entries in that list.

2. To enter a formula that uses data from other lists, arrow up to the heading:

- While in the heading, enter the operations:

eg: Use: L1 - L2

for the differences for a paired-t test,

where L1 contains Before data and L2 contains After data

(Note: Unlike a spreadsheet the formula list does not change if the original data changes. You will need to redo the formula if you change the data it uses.)

Return to TOC

Statistics Home Page Class Notes

Instructions for Using the Calculator for Statistics

Descriptive Statistics

General Statistics - mean, median, stdev, quartiles, etc

STAT / EDIT

1. Edit

Enter data into L1 (or other)

STAT / CALC

1: 1-Var Stats

Returns: $\bar{x}$, Σx, Σx^2, s, σ, n,
minX, Q1, Med, Q3, maxX

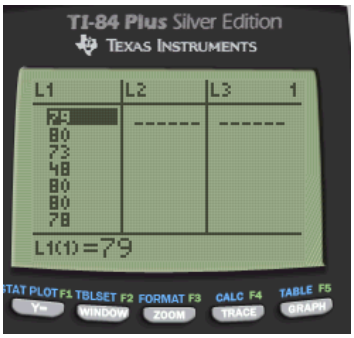
Return to TOC

Statistics Home Page

Class Notes

3.121 The Great Gretzky - 5 NUMBER SUMMARY

1. **Enter data into a list on the calculator.**
   STAT/ EDIT



2. **Turn ON STAT PLOT, Plot1 and enter settings for a 5 Number Summary BOX PLOT.**
   Select the 5th graph (line 2, middle) under Type:

Return to TOC

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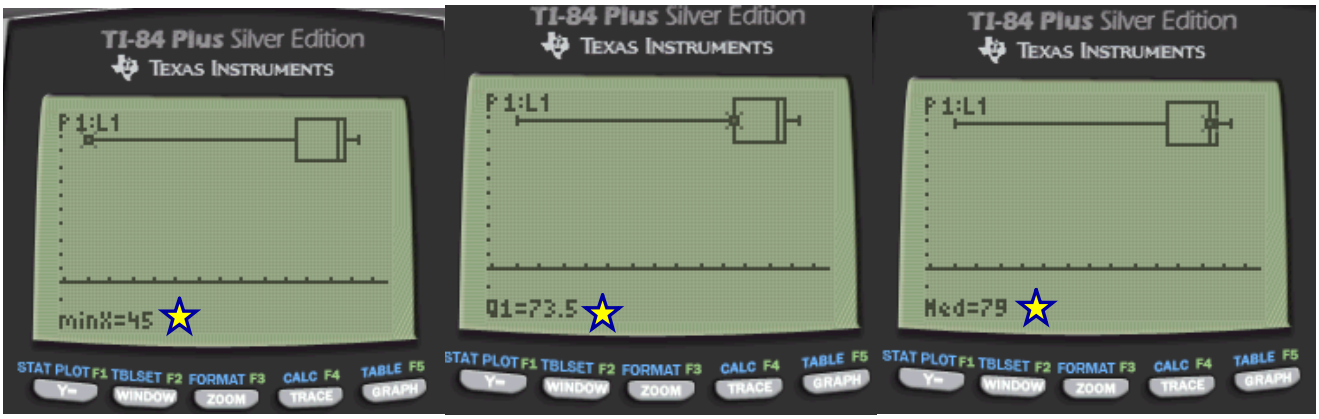
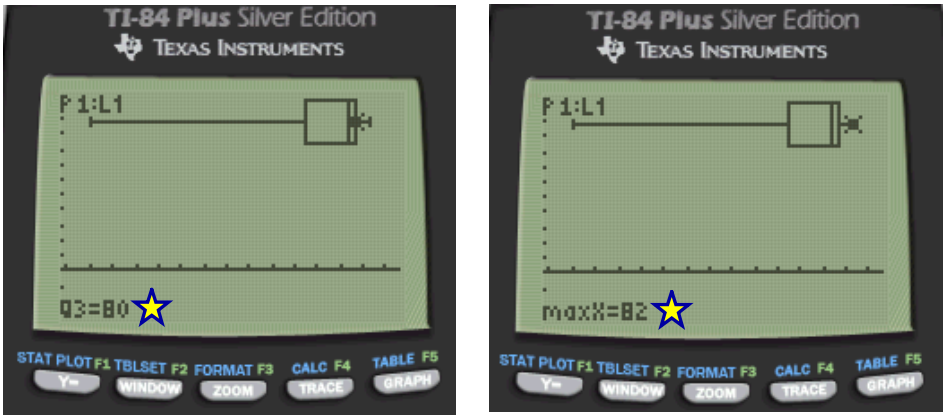
3. **Using TRACE button, arrow through the 5 Number Summary from left to right to get all 5 numbers.**





Return to TOC

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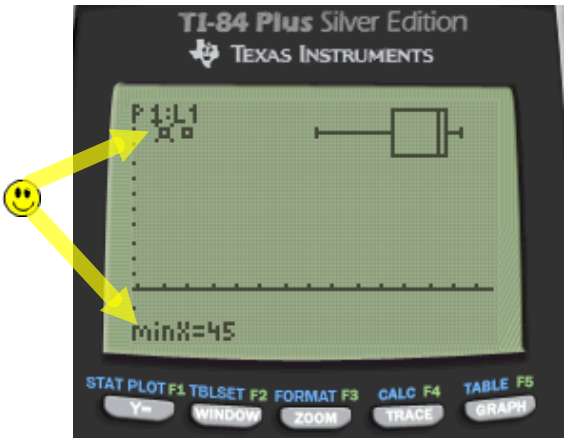
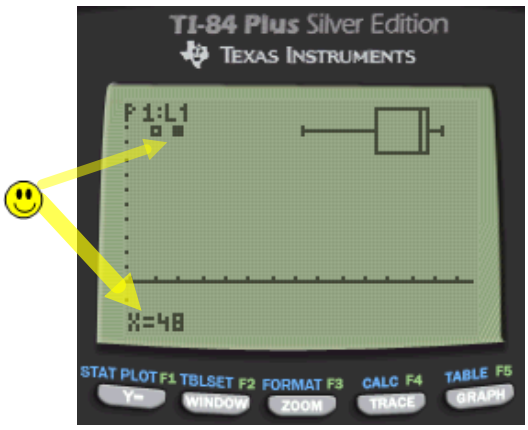
3.121 The Great Gretzky - BOX PLOT

1. In STAT PLOT, select the 4th graph (line 2, left) under Type: This is a BOX PLOT w. Outliers

2. Using TRACE button, arrow through the Box Plot from left to right to get LL, Q1, M, Q3, UL, along with any potential outliers.



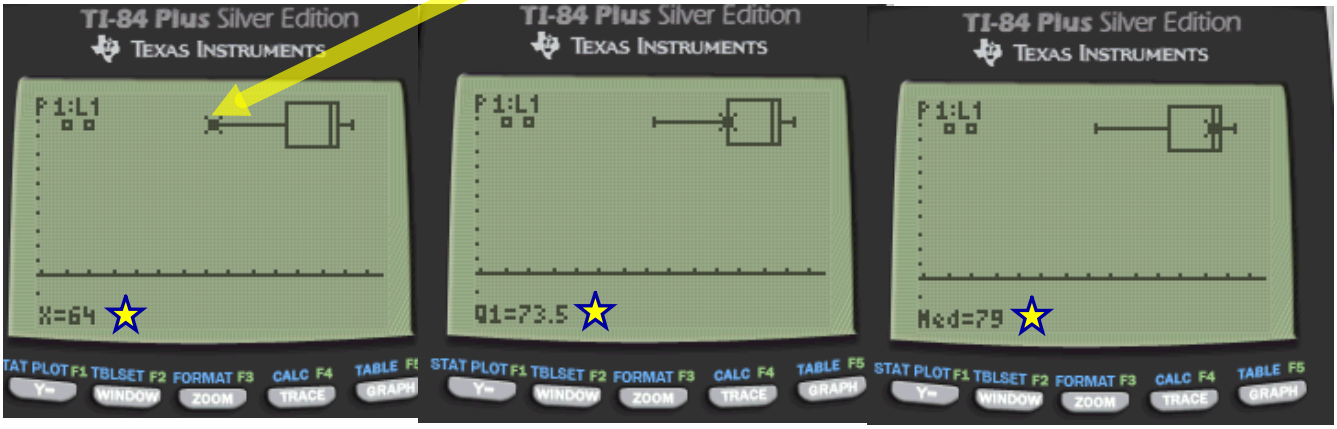


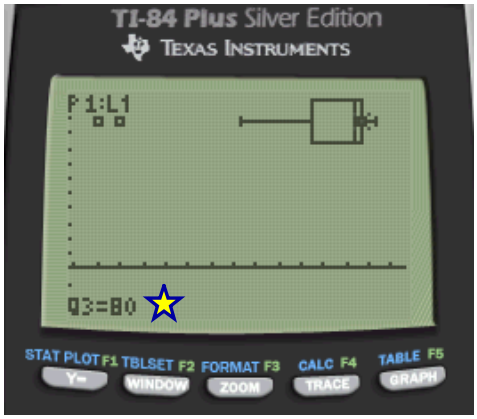
Return to TOC

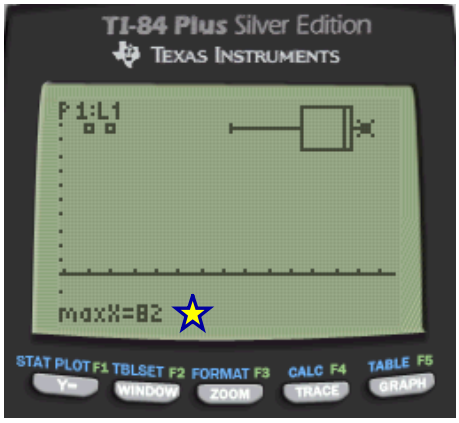
Statistics Home Page

Class Notes

3. Using TRACE button, arrow through the Box Plot from left to right to get LL, Q1, M, Q3, UL, along with any potential outliers.







Return to TOC

Instructions for Using the Calculator for Statistics

Descriptive Statistics

Histogram by Calculator

1. **STAT / EDIT**, enter data in L1 (or other)
2. 2nd StatPlot / Plot 1 (or other)
3. Select ON
4. Type: histogram (top right)
5. xList: L1 (or other)
6. ZOOM/ STAT
7. To adjust histogram to problem specs, use
   WINDOW options:
   a) Xscl to change class width
   b) Xmin and Xmax

eg: to use histogram for single-value grouping of values from 1 to 8,
use Xmin = 0.5, Xmax = 8.5, and Xscl = 1

Return to TOC

Statistics Home Page

Class Notes

Instructions for Using the Calculator for Statistics

Distributions: Normal, Student-t

Find Area under the Normal Curve

2nd DISTR

normalcdf(left, right, mean, standard deviation)

Use this for any normal curve.
If using the Standard Normal Curve (SNC), the mean = 0 and the standard deviation = 1

eg: To find the area between z = -1 and z = 1 on the SNC, enter:
normalcdf(-1,1,0,1) The result is .6827

eg: To find the area between x = 60 and x=85 for a normal distribution with mean=75 and stdev=10, enter:
normalcdf(60,85,75,10) The result is .7745

To get areas in the left tail of the SNC, use -9 for the left bound.
To get areas in the right tail of the SNC, use +9 for the right bound.

Return to TOC

Statistics Home Page

Class Notes

Instructions for Using the Calculator for Statistics

Distributions: Normal, Student-t

Find Area under the *Student-t* Curve

2nd DISTR

tcdf(left, right, degrees of freedom)

Can be used to find the P-value when you have found a test statistic for *t*

eg: To find the area in the tail past the test statistic, t=1.246,
for a sample of size 11,enter:

tcdf(1.246,9,10) The result is .1206

To get areas in the left tail of the t-curve, use -9 for the left bound.
To get areas in the right tail of the t-curve, use +9 for the right bound.

Return to TOC

Statistics Home Page ©Gertrude Battaly, 2012 Class Notes

Instructions for Using the Calculator for Statistics

Distributions: Normal, Student-t

Find a z-score for a Given Area

2nd DISTR

invNorm(area to left,mean,standard deviation)

Use this for any normal curve.
If using the Standard Normal Curve (SNC), the mean = 0 and the standard deviation = 1

eg: To find the z-score for an area of 0.95 to the left (equivalent to finding a z-score for 0.05 area to its right), enter:

invNorm(.95,0,1) The result is 1.6449

Return to TOC

Statistics Home Page Class Notes

Instructions for Using the Calculator for Statistics

Distributions: Normal, Student-t

Find a t-score for a Given Area and degrees of freedom

2nd DISTR

invT(area to left,df)

Notice that the mean and standard deviation are not required. The degrees of freedom, df, accounts for the correct curve.

eg: For a t-curve with df = 10, to find the t-score for an area of 0.95 to the left (equivalent to finding a t-score for 0.05 area to its right), enter:

invT(.95,10) The result is 1.8125

Return to TOC

Statistics Home Page

Class Notes

Instructions for Using the Calculator for Statistics

Distributions: Normal, Student-t

Normal Probability Plot

1. **STAT / EDIT**, enter data in L1 (or other)
2. 2nd StatPlot / Plot 1 (or other)
3. Select ON
4. **Type: Normal Probability Plot** (bottom right)
Click on this to select it.
5. xList: L1 (or other)
6. ZOOM/ STAT

Return to TOC

Statistics Home Page

Class Notes

Instructions for Using the Calculator for Statistics

Inferential Statistics, One Mean

To Find **z-Interval**

Confidence Interval for One Mean, σ known

(assumptions: SRS, normal distribution)

STAT / TESTS

ZInterval

Inpt: STAT

σ: 11.2

$\bar{x}$: 146.9

n: 36

C-Level: .95

Calculate

Result: (143.24,150.56)

This is the interval within which you would have 95% confidence that the population mean lies.

The values entered above are an example. Use the values appropriate for your problem.

Return to TOC

Statistics Home Page

Class Notes

Instructions for Using the Calculator for Statistics

Inferential Statistics, One Mean

To Find **t-Interval**

Confidence Interval for One Mean, σ NOT known

(assumptions: SRS, normal distribution)

STAT / TESTS

TInterval

Inpt: STAT

$\bar{x}$: 25

S_x: 3

n: 36

C-Level: .95

Calculate

Result: (23.985,26.015)

You can conclude with 95% confidence that the mean lies within this interval.

Return to TOC

Statistics Home Page

Class Notes

Instructions for Using the Calculator for Statistics
Inferential Statistics, One Mean

z-Test for One Mean, σ known

(assumptions: SRS, normal distribution)

STAT / TESTS
Z-Test
Inpt: STAT
μ: 75
σ: 10
$\bar{x}$: 82
n: 23
μ: $\neq\mu_0$ $<\mu_0$ $>\mu_0$
Calculate Draw

Result: z=3.3571, P=3.9390E-4
The P-Value = 3.9390 (10^{-4}) = 0.0003939

The values and alternative hypothesis entered above are an example. Use the values appropriate for your problem.

Return to TOC

Statistics Home Page


Class Notes


Instructions for Using the Calculator for Statistics
Inferential Statistics, One Mean

t-Test for One Mean, σ NOT known

(assumptions: SRS, normal distribution)

STAT / TESTS
T-Test
Inpt: STAT
μ: 75
$\bar{x}$: 79
S_X: 10
n: 23
μ: $\neq\mu_0$ $<\mu_0$ $>\mu_0$
Calculate Draw

Result: t=1.9183, P=0.0341

The values and alternative hypothesis entered above are an example. Use the values appropriate for your problem.

Return to TOC

Statistics Home Page Class Notes

Instructions for Using the Calculator for Statistics

Inferential Statistics, Two Means

t-Test for Two Means, Pooled

σ's EQUAL, but NOT known (assumptions: SRS, normal distribution)

STAT / TESTS

2SampTTest

Inpt: STATs

$\bar{x}_1$: 10

S_{X1}: 4

n1: 15

$\bar{x}_2$: 12

S_{X2}: 5

n2: 15

μ: ≠μ0 <μ0 >μ0

Pooled: No Yes

Calculate Draw

Result: t=-1.2097, P=0.11825, df=28, pooled s= 4.5277

The values and alternative hypothesis entered above are an example. Use the values appropriate for your problem.

Return to TOC

Statistics Home Page

Class Notes

Instructions for Using the Calculator for Statistics

Inferential Statistics, Two Means

t-Test for Two Means, Non-Pooled

σ's NOT equal, but NOT known (assumptions: SRS, normal distribution)

STAT / TESTS

2SampTTest

Inpt: STATs

$\bar{x}_1$: 10

S_{X1}: 2

n1: 15

$\bar{x}_2$: 12

S_{X2}: 5.5

n2: 15

μ: ≠μ0 <μ0 >μ0

Pooled: No Yes

Calculate Draw

Result: t = -1.3236, P=0.10127, df=17.639

The values and alternative hypothesis entered above are an example. Use the values appropriate for your problem.

Return to TOC

Statistics Home Page

Class Notes

Instructions for Using the Calculator for Statistics

Inferential Statistics, Two Samples

Paired - t Test

(assumptions: SRS, normal differences or large sample)

1. Enter Before data in L1 and After data in L2.
2. In the header for L3, type:
   L1 - L3 / ENTER
   L3 will fill in with the difference of the L1 and L2 values. If you change any values in L1 or L2, you need to repeat this step.
3. STAT / TESTS
   T-Test
   Inpt: DATA
   μ: 0
   LIST: L3
   S_X: 10
   μ: $\neq\mu_0$ $<\mu_0$ $>\mu_0$
   Calculate
   Use the Alternative Hypothesis appropriate for your problem.

Return to TOC

Statistics Home Page

Class Notes

Instructions for Using the Calculator for Statistics

Inferential Statistics, Chi-Squared Tests

Chi-Squared Goodness-of-Fit

(assumptions: SRS, all expected freq ≥1, at most 20% of expected ≤5)

Calculator: χ^2 GOF Test

1. Enter observed data into L1
2. Enter expected probabilities into L2
3. Find Σx, the sum of observed values
4. In the header for L3, compute *np*:
   L2 x (Σx) (expected values)
5. STAT/TESTS/ χ^2 GOF-Test
   Observed: L1
   Expected: L3
   df: #categories - 1
   CALCULATE

Calculator: χ^2 **w/o** GOF Test

1. Enter observed data into L1
2. Enter expected probabilities into L2
3. Find Σx, the sum of observed values
4. In the header for L3, compute *np*:
   L2 x (Σx) (expected values)
5. In header for L4, compute indiv χ^2
   $(O - E)^2 / E$, or
   $(L1-L3)^2 / L3$ using column headings
6. STAT/CALC/1-Variable Stats/ **L4**
   Find Σx
   This is the **test statistic,** χ^2
7. Use critical value or find p from table.

Return to TOC

Statistics Home Page Class Notes

Instructions for Using the Calculator for Statistics

Inferential Statistics, Chi-Squared Tests

Chi-Squared Goodness-of-Fit

(assumptions: SRS, all expected freq ≥1, at most 20% of expected ≤5)

Calculator:

1. 2nd Matrix/ Edit / [A]
2. Enter # of rows, # columns
3. Enter observations
   - the red numbers in the table
4. STAT/ TESTS/ χ^2-Test
5. Hit Enter for [A] and for [B]
6. Select Calculate
   Answer will include test statistic, p-value, and df.
   Find expected values in matrix B:
   2nd Matrix/ Edit / [B]

Return to TOC

Statistics Home Page Class Notes

Instructions for Using the Calculator for Statistics

Inferential Statistics, Linear Correlation

Correlation t-Test

(assumptions: population regr. line, =stdev,
normal distribution, independent observations)

STAT / TESTS

LinRegT-Test

Xlist: L1 (list where entered x values)

Ylist: L2 (list where entered y values)

β and ρ: $\neq 0$ < 0 > 0

Calculate

Results include:

test t, p, df, a and b for regression equation,

s, r, r^2

Return to TOC

Statistics Home Page

Class Notes