StatFun83:
TI-84 and TI-NSpire Statistical Functions for the TI-83 Graphing Calculator

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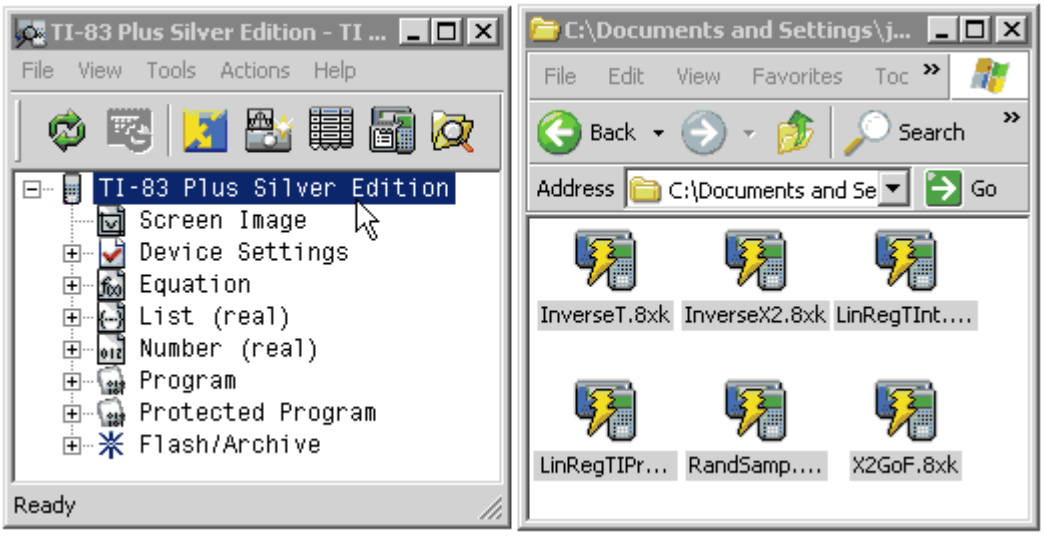
Summary: StatFun83 gives TI-83 and TI-84 calculators the statistical features from the later-model TI-84, TI-89, and TI-Nspire, as a set of flash-memory Apps or a set of programs:

Dots	Dot plot of value frequencies
InverseT	Inverse *t* distribution
Invχ^2	Inverse cumulative χ^2 distribution
LinRegTInt	Linear Regression *t*-Interval
LinRegTIP	Linear Regression *t*-Interval with prediction
RandSamp	Random sample of list with or without replacement
χ^2GOF-Test	Chi-square Goodness-of-Fit

Apps Installation: Download StatFun83.zip to your computer. Use a zip utility to extract the files (often just by double-clicking and dragging the files), and click open the Apps folder. Connect the TI-83 or TI-84 calculator to the computer. Turn on the calculator.

Start the TI-Connect program. Open TI Device Explorer. Drag the desired application files (ending in .8xk) to the TI Device Explorer top line as illustrated here.



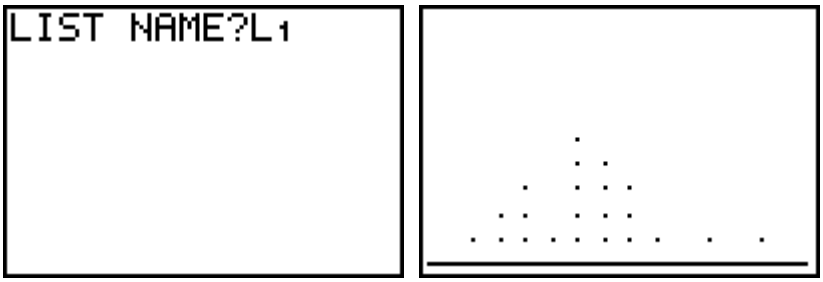
You can similarly drag Basic programs (.8xp files) to TI Device Explorer.

Usage Notes and Demonstrations

Press the APPS key. (Or press the PRGM key if you have chosen to use programs.) Select the desired function. Input and output variables generally correspond to those of the TI-84+ calculator, with some additions for the TI-Nspire.

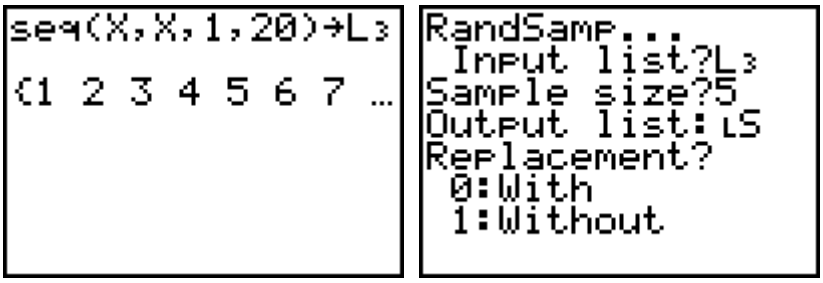
Dots

This function displays a dotplot of the specified list. This is a TI-Nspire built-in that is not built-in for TI-83 or TI-84 calculators. Use the TRACE function to examine dot values.

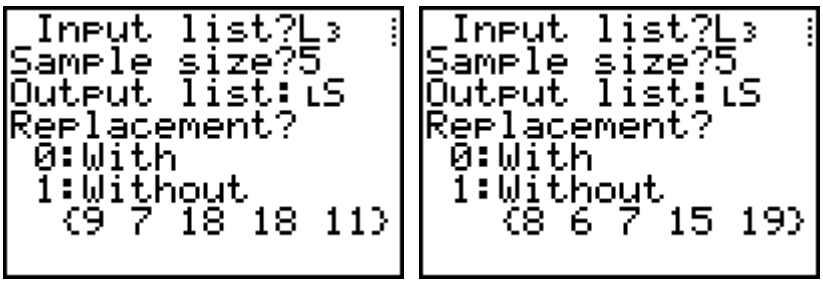


RandSamp

This function stores and displays a list ₗS that contains elements of any input list sampled with replacement or without replacement. The following demonstration shows how to fill list L3 with integers 1 through 20, then use RandSamp to select samples. RandSamp is a TI-Nspire built-in that is not built-in for TI-83 or TI-84 calculators.

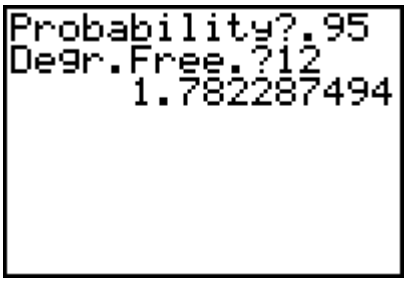


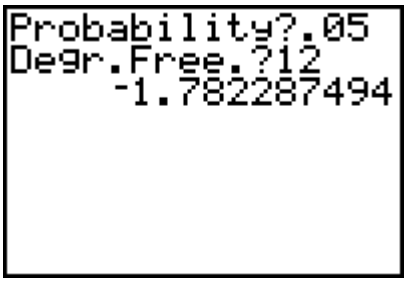
"Output list: ₗS" is unchangeable and displayed as a reminder.



InverseT: Inverse *t* Function

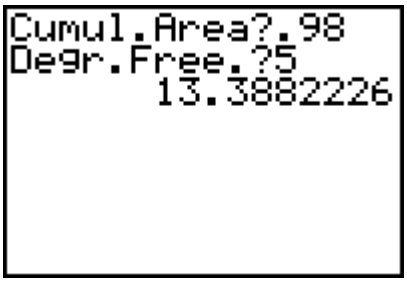
This function computes the cumulative *t* value corresponding to inputs of left-side area (probability) and degrees of freedom, displaying and storing the result in variable T.





InverseX2: Inverse Cumulative χ^2 Function

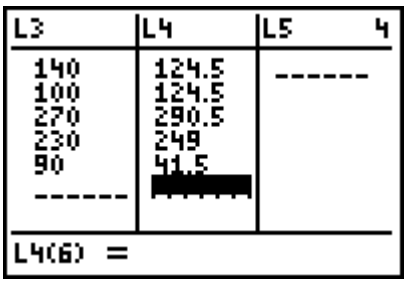
This function computes the cumulative χ^2 value corresponding to inputs of left-side area (probability) and degrees of freedom, displaying and storing the result in variable C.



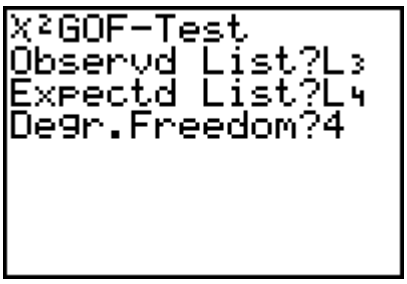
X2GoF: χ^2 Goodness of Fit Test

Chi Square Goodness of Fit tests to confirm that observed sample data is or is not from a population that conforms to an expected distribution.

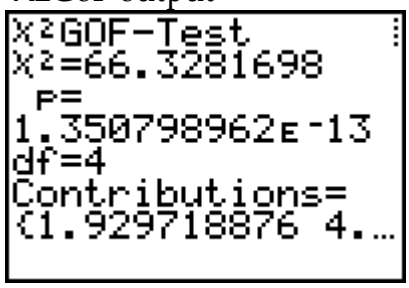
X2GoF Test Data



X2GoF



X2GoF output

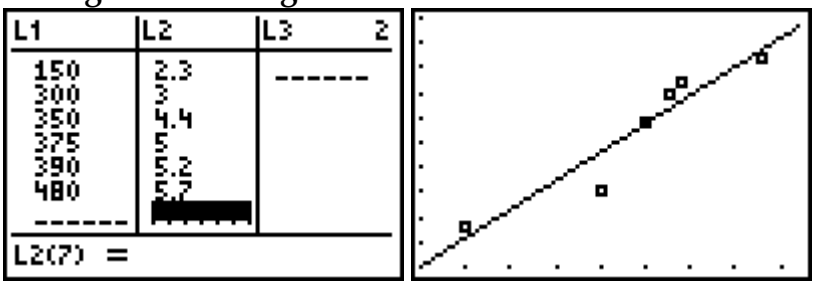


As does its TI-84 counterpart, **X2GoF** stores results to variables χ^2, df, p, and list LCNTRB

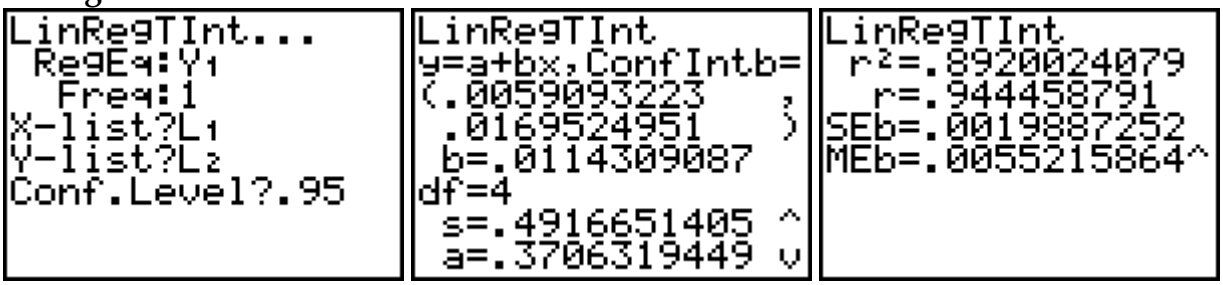
LRTInt: Linear Regression T-Interval
LRTIP: Linear Regression T-Interval with Prediction

These functions calculation confidence intervals associated with Linear Regression. LRTInt is an abridged form of LRTIP which does not request and x-value input and does not produce associated statistics for the predicted y-value. LRTInt is built-in to TI-84 calculators, but LRTIP is not. LRTIP is built-in on the TI-Nspire. Following are input and output variables.

LinRegTInt / LinRegTIP test data

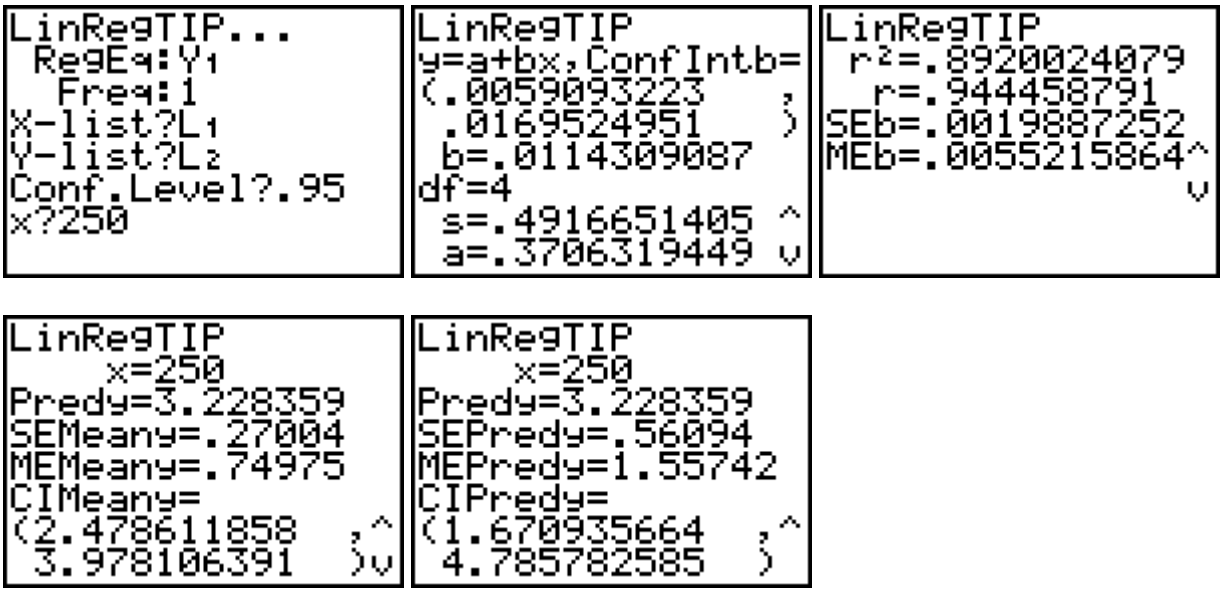


LinRegTInt



"RegEq:Y1" and "Freq:1" are unchangeable and are displayed as reminders.
SEb and MEb are outputs not from the TI-84 but from the TI-Nspire.

LRTIP



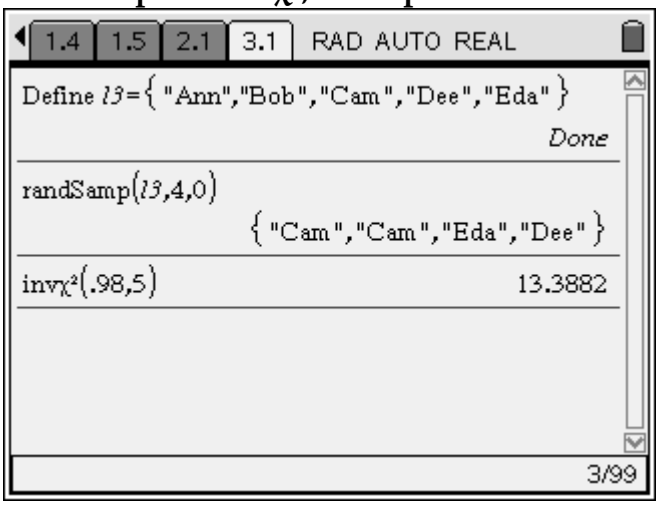
Paging backward and forward is possible via arrow and Enter keys.

The following table lists input and output variables for LRTInt and LRTIP.

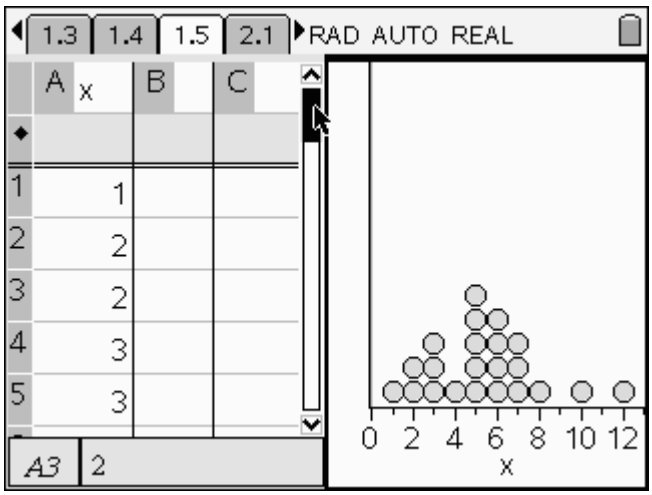
`Xlist`	Input: list such as L1 containing the explanatory variable
`Ylist`	Input: list such as L2 containing the response variable
`Conf.Level`	Input: confidence level such as .95
`x`	Input to LinRegTIP: a value of the explanatory variable, also notated x^* or x_v.
`a`	Constant term of linear regression equation $y = a + bx$.
`b`	Slope of linear regression equation $y = a + bx$.
`df`	Degrees of freedom
`r`	Correlation coefficient
r^2	Coefficient of determination
`s`	s or s_e, standard deviation of errors (residuals) about the line, $s = \sqrt{\frac{\Sigma(y-\hat{y})^2}{n-2}}$
`SEb`	$SE(b)$, $SE(b_1)$ or s_b. Standard error of slope b. $SE(b) = \frac{s}{\sqrt{\Sigma(x-\bar{x})^2}}$
`MEb`	$ME(b)$ or $ME(b_1)$. Margin of error of confidence interval for slope b. $ME(b)=(t)(s)$.
ConfIntb	Confidence interval for slope b. CIb = b ± MEb.
`Predy`	$\hat{y}$, "y hat", the predicted value of the response variable, $\hat{y} = a + bx$.
`SEMeany`	Standard Error of mean $\hat{y}$, $SE(\mu_{\hat{y}}) = \sqrt{(SE^2(b))(x-\bar{x})^2 + \frac{s_e^2}{n}}$
`MEMeany`	Margin of error for mean $\hat{y}$ confidence interval. `MEMeany` $= (t)(SE(\mu_{\hat{y}}))$
`CIMeany`	Confidence interval for mean $\hat{y}$. CIMEany = Predy ± MEMeany.
`SEPredy`	Standard Error of individual predicted $\hat{y}$, $SE(\hat{y}) = \sqrt{(SE^2(b))(x-\bar{x})^2 + \frac{s_e^2}{n} + s_e^2}$
`MEPredy`	Margin of error for individual predicted $\hat{y}$ confidence interval, $= (t)(SE(\hat{y}))$.
`CIPredy`	Prediction interval for individual $\hat{y}$. `PredInty` = Predy ± MEPredy.

Comparative Screens

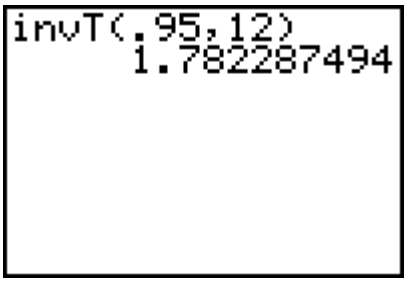
randSamp and invχ², TI-Nspire



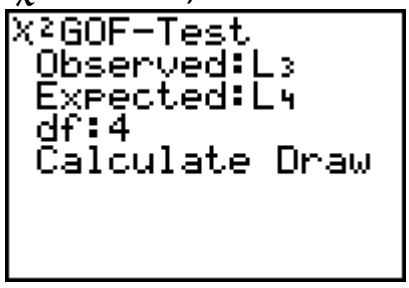
Dot Plot, TI-Nspire

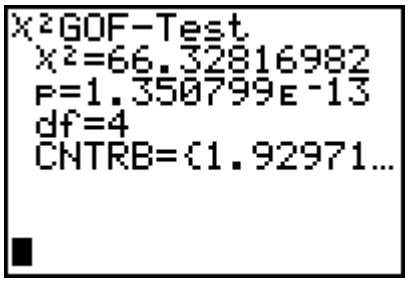


Inverse *t* function, TI-84+

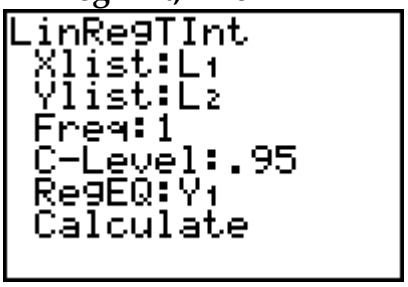


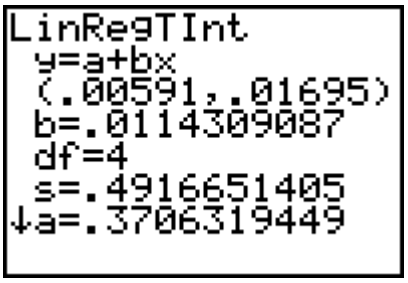
χ²GOF-Test, TI-84+

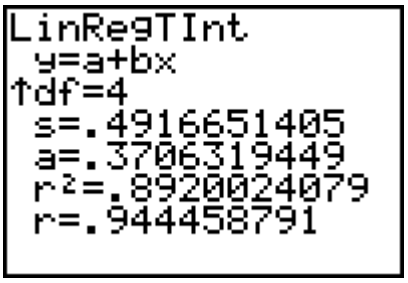




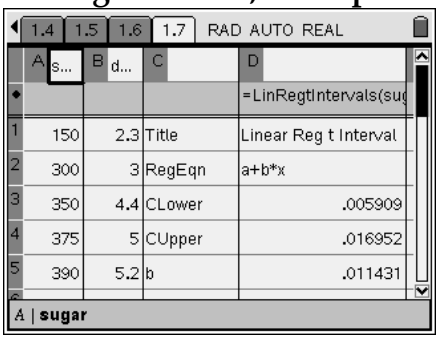
LinRegTInt, TI-84+

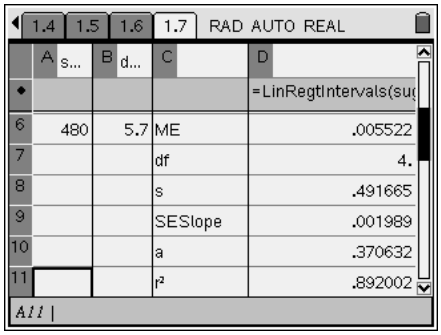


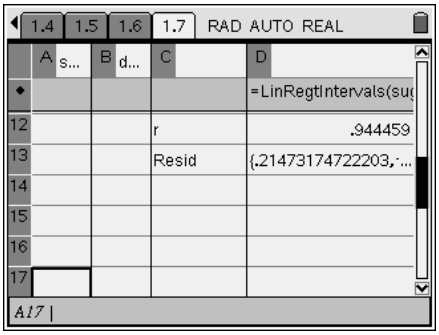


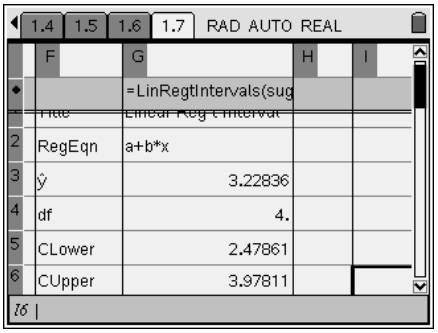


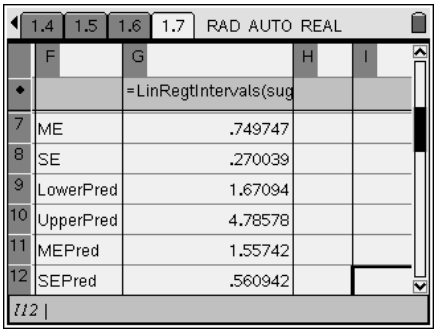
LinRegtIntervals, TI-Nspire

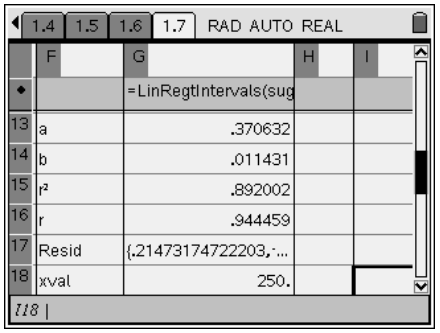












Notes:

1. Choice of variables (such as area instead of $t_{\alpha/2}$) and display format aims for compatibility with TI calculators.

2. The functions in this package comply with College Board AP Statistics Exam requirements: "For the exam, you're not allowed to access any information in your graphing calculators or elsewhere if it's not directly related to upgrading the statistical functionality of older graphing calculators to make them comparable to statistical features found on newer models." The TI-83, TI-84, TI-89, and TI-Nspire are among the calculators approved for the AP Statistics and AP Calculus exams.

3. Flash memory Apps are not cleared by the "clear RAM" reset. Thus, these are more expedient than Basic programs for shared-calculator classrooms.

4. Basic Builder 3.0 created these applications from the included TI-Basic source. Use TI-Graph Link to display, edit, or reset the protect attribute of such programs.

5. Programs borrow ideas from several sources, notably: Math Forum discussions, Stephen Kokoska, Michael Lloyd, and David Neal. Dots is a one-plot memory-conserving version of the multi-dotplot from Key College Publishing Workshop Statistics.

6. There are odds and ends of built-in statistical functions for calculators approved for standardized exams that are not yet implemented in this collection. More models of calculators may be approved, and approved calculators may add built-in functions. So check back for updates and any corrections. Of course, please report corrections or suggestions to me.

7. Revisions: The March 2008 release allows InverseT to handle $p < 0.50$. Dots added.

TI Basic Programs

Dots

```
FnOff:AxesOff:PlotsOff
ClrHome:ClrDraw
Input "LIST NAME?",Str1
expr(Str1)→X
ClrHome
Ø→dim(ʟY
Lbl 14
dim(ʟX)→E
min(abs(ʟX))→D
SortA(ʟX
For(P,⁻6,6
If D>1Ø^(⁻P
Then
1+P→P
If P≠Ø
round(ʟX*1Ø^(P),Ø)*1Ø^(⁻P)→ʟX
Goto 19
End
End
Lbl 19
stdDev(ʟX)→W
1→ʟY(1
1→N
Lbl 1
1→M
Lbl 2
If (ʟX(N+1)-ʟX(N))/W<.Ø5
Then
ʟX(N)→ʟX(N+1
M+1→ʟY(N+1
Else
1→ʟY(N+1
Ø→M
End
If N≥dim(ʟX)-1
Then
Goto O
Else
M+1→M
N+1→N
End
Goto 2
Lbl O
Plot3(Scatter,ʟX,ʟY,·
1-Var Stats ʟX
max(ʟY)→R
Sx→L
minX→M
maxX→N
M-L/1.5→Xmin
N+L/1.5→Xmax
Ø→Ymin
2*R+2.5→Yscl
round(Xmax+L/2+1,Ø)→Xscl
If R=1
1Ø→Ymax
If R>1 and R≤4
8→Ymax
If R>4
R+5→Ymax
ClrHome
Horizontal Ø
DispGraph
DelVar D:DelVar E:DelVar L:DelVar M DelVar
N:DelVar P:DelVar R:DelVar W
```

InverseX2

```
Input "Cumul.Area?",A
Input "Degr.Free.?",D
"χ² cdf(X,E99,D)-1+A"→Y₀
solve(Y₀,X,D,{Ø,E99})→C
DelVar Y₀:DelVar A:DelVar D
C
```

X2GoF

```
ClrHome
Disp "χ² GOF-Test"
Input "Observd List?",ʟLOBS
Input "Expectd List?",ʟLEXP
Input "Degr.Freedom?",D
ClrHome
Disp "χ² GOF-Test","χ² =","
p=","","df=","Contributions="
(ʟLOBS-ʟLEXP)² / ʟLEXP→ʟCNTRB
sum(ʟCNTRB)→S
Output(2,4,round(S,7
Output(4,1,χ² cdf(S,E99,D
Output(5,4,D
Pause ʟCNTRB
DelVar ʟLOBS:DelVar ʟLEXP
```

RandSamp

```
ClrHome
Disp "RandSamp..."
Input " Input list?",ʟINL
Input "Sample size?",N
Disp "Output list:ʟS","Replacement?","
Ø:With"," 1:Without"
Repeat K=1Ø2 or K=92
getKey→K
End
If K=92
Goto 1
N→dim(ʟS)
dim(ʟINL)→K
For(I,1,N)
ʟINL(randInt(1,K))→ʟS(I)
End
DelVar ʟINL
Pause ʟS
Stop
Lbl 1
ʟINL→ʟS
dim(ʟS)→K
K→dim(ʟRAN)
seq(rand,I,1,K)→ʟRAN
SortA(ʟRAN,ʟS)
If N<dim(ʟS)
N→dim(ʟS)
DelVar ʟINL
DelVar ʟRAN
Pause ʟS
```

InverseT

```
Input "Probability?",P
Input "Degr.Free.?",D
TInterval Ø,√(D+1),D+1,abs(2P-1
If P≥.5
Then
upper→T
Else
lower→T
End
T
```

LRTIP

```
Lbl 1
ClrHome
Disp "LinRegTIP..."," RegEq:Y₁","  Freq:1"
Input "X-list?",ʟXLI
Input "Y-list?",ʟYLI
Input "Conf.Level?",C
Input "x?",X
dim(ʟXLI)→N
TInterval Ø,√(N-1),N-1,C
upper→T
LinRegTTest ʟXLI,ʟYLI,Ø,Y₁
s/Sx/√(N-1)→E
TE→M
a+bX→Y
√(E²(X-x̄)²+s²/N)→F
TF→G
√(E²(X-x̄)²+s²(1+1/N))→H
TH→I
Lbl 2
ClrHome
Disp "LinRegTIP","y=a+bx,ConfIntb=","(","
","," b=","df="," s="
Output(3,2,b-M
Output(3,16,","
Output(4,2,b+M
Output(4,16,")"
Output(5,4,b
Output(6,4,N-2
Output(7,4,s
Output(7,16,"^ a="
Output(8,4,a
Output(8,16,"v"
Repeat K=25 or K=34 or K=1Ø5
getKey→K
End
If K=25
Goto 1
Lbl 3
ClrHome
Disp "LinRegTIP"," r²="," 
r=","SEb=","MEb="
Output(2,5,r²
Output(3,5,r
Output(4,5,E
Output(5,5,M
Output(5,16,"^"
Output(6,16,"v"
Repeat K=25 or K=34 or K=1Ø5
getKey→K
End
If K=25
Goto 2
Lbl 4
ClrHome
Disp "LinRegTIP","
x=","Predy=","SEMeany=","MEMeany=","CIMean
y=","("
Output(2,7,round(X,6)
Output(3,7,round(Y,6)
Output(4,9,round(F,5)
Output(5,9,round(G,5)
Output(7,2,Y-G
Output(7,15,",^"
Output(8,2,Y+G
Output(8,15,")v"
Repeat K=25 or K=34 or K=1Ø5
getKey→K
End
If K=25
Goto 3
Lbl 5
ClrHome
Disp "LinRegTIP","
x=","Predy=","SEPredy=","MEPredy=","CIPred
y=","("
Output(2,7,round(X,6)
Output(3,7,round(Y,6)
Output(4,9,round(H,5)
Output(5,9,round(I,5)
Output(7,2,Y-I
Output(7,15,",^"
Output(8,2,Y+I
Output(8,15,") "
Repeat K=25 or K=34 or K=1Ø5
getKey→K
End
If K=25
Goto 4
DelVar ʟXLI
DelVar ʟYLI
DelVar K
```

LRTInt is an abridgement of LRTIP.