

TI-85/TI-86 Calculator Appendix

Programs listed below are referenced in *Part B* of this *Guide*. They should be transferred to you via a cable using the LINK mode of a TI-85 or a TI-86, transferred to your calculator using the TI-GRAPH LINK™ cable and software for a PC or Macintosh computer and a disk containing these programs, or, as a last resort, typed in your calculator. Refer to your owner's *Guidebook* for instructions on typing in the programs or transferring them via a cable from another calculator.

(Instructors who have the TI-GRAPH LINK™ software can contact the author of this *Guide* at ibbrh@clermson.edu and request that the programs be sent to them via e-mail or on a computer disk. Be sure to specify whether you use a Macintosh or a PC-compatible computer for either method of obtaining the programs. All programs can then easily be transferred to students.)

The programs and the chapter of *Calculus Concepts* in which each program is first referenced are listed below. The programs given below run on both the TI-85 and TI-86 graphing calculators, but not all the programs are needed for the TI-86. All these programs can be transferred directly from a TI-85 to a TI-86 and vice-versa.

| PROGRAM NAME | PROGRAM SIZE (bytes) | CHAPTER FIRST REFERENCED | CALCULATOR |
|-----------------|-------------------------|-----------------------------|--------------|
| DIFF | 889 | 1 | TI-85, TI-86 |
| STPLT | 380 | 1 | TI-85 |
| TABLE | 485 | 1 | TI-85 |
| LOGISTIC | 2069 | 2 | TI-85 |
| MDVAL | 171 | 6 | TI-85 |
| NUMINTGL | 1514 | 6 | TI-85, TI-86 |
| SINREG | 1406 | 8 | TI-85 |
| EULER | 303 | 11 | TI-85, TI-86 |
| OPTIONAL | | | |
| LSLINE | 614 | 1 | TI-85, TI-86 |
| SECTAN | 581 | 4 | TI-85, TI-86 |

The code for each of the programs follows. If you have to type in these programs rather than having them transferred from another calculator or a

computer, it is strongly suggested that you compare the line-by-line instructions given in the code with what you type in your calculator. Both the TI-85 and the TI-86 distinguish between upper and lower case letters, so be sure you use the same case as in the program code. Even one misplaced symbol or letter will cause the program to not properly execute.

```

DIFF      • Program
:CILCD
:Disp "Store x-values in L1"
:Disp "Store y-values in L2"
:Disp "Continue?"
:Menu(1,"Yes",GO,2,"Quit",NO)
:Lbl NO
:Stop
:Lbl GO
:dimL L1ÍM
:dimL L2ÍN
:If M≠N:Goto Z
:N-1ÍdimL L6
:For(H,1,N-1,1)
:L1(H+1)-L1(H)ÍL6(H)
:End
:For(H,1,N-2,1)
:If L6(H+1)≠L6(H)
:Goto FN
:End
:N-1ÍdimL L3
:For(A,1,N-1,1)
:L2(A+1)-L2(A)ÍL3(A)
:End
:N-2ÍdimL L4
:For(B,1,N-2,1)
:L3(B+1)-L3(B)ÍL4(B)
:End:CILCD
:Disp "Choice?"
:Lbl RC
:Menu(1,"1st",FST,2,"2nd",SEC,3,
"%",PER,4,"Quit",QT)
:Lbl FST
:Disp "1st differences in L3"
:Disp L3
:Goto RC
:Lbl SEC
:Disp "2nd differences in L4"
:Disp L4
:Goto RC
:Lbl PER
:N-1ÍdimL L5
:1ÍE
:For(E,1,N,1)
:If L2(E)==0:Goto W
:End
:For(E,1,N-1,1)
:(L3(E)/L2(E))*100ÍL5(E)
:End
:Disp "percent change in L5"

```

```

:Disp L5
:Goto RC
:Lbl Z
:Disp "Lists are of unequal"
:Disp "length. Check data."
:Stop
:Lbl W
:0ÍdimL L5
:Disp "percent change not"
(Program DIFF continued)
:Disp "calculated...cannot"
:Disp "divide by 0"
:Goto RC
:Lbl QT
:Stop
:Lbl FN
:Disp "Input values not"
:Disp "evenly spaced"
:Stop

```

```

EULER      • Program
:CILCD
:0ÍdimL L1:0ÍdimL L2
:FnoFF
:Disp "HAVE dy/dx in y1"
:Disp ""
:Input "Number of steps= ",N
:Input "Step size= ",H
:Input "Initial input= ",x
:Input "Initial output= ",y
:For(I,1,N,1)
:xÍL1(I)
:yÍL2(I)
:y1ÍT
:x+HÍx
:y+H*Íy
:Disp "Input,Output is"
:Disp x
:Disp y
:Pause
:End
:xÍL1(N+1):yÍL2(N+1)
:STPLT
:xyline (L1,L2)

```

```

LOGISTIC      • Program
:CILCD
:Disp "Data in LĪ,LĪ"
:Disp ""
:Disp "Enter continues"
:Pause
:CILCD
:If dimL L1≠dimL L2:Then
:Disp "List lengths not"
:Disp "equal"
:Stop
:End
:dimL L1ĪM
:MĪdimL L5
:max(L2)*1.01ĪZ
:ZĪC
:sum L1ĪT
:ln L2ĪL6
:sum L6ĪV
:0ĪN
:Repeat (C≤Z) or (N==3)
:ln (-1*L2+C)ĪL5
:sum L5ĪU
:(-sum (L5*L1)+sum (L6*L1)+(U-
  V)/M*T)/(sum (L1%)-T%/M)ĪB
:e^((U-V+B*T)/M)ĪA
:e^(-B*L1)ĪL4
:(1+A*L4),ĪL5
:sum (L2*L5)/sum (L5%)-ĪC
:End
:C*L5ĪL3
:sum ((L3-L2)%)-ĪE
:0ĪN
:√.5Ī-10ĪY
:2*YĪR
:CILCD
:Outpt(2,1,"STEP:")
:Outpt(6,1,"SSE:")
:While (R>Y) and (N<20)
:N+1ĪN
:Outpt(2,7,N)
:Outpt(6,6,E)
:{3,1}Īdim MatA
:CĪMatA(1,1):AĪMatA(2,1):BĪ
  MatA(3,1)
:Outpt(3,2,"Working...")
:e^(-B*L1)ĪL4
:(1+A*L4),ĪL5
:C*L5ĪL3
:L4*L5%ĪL6
:{3,1}Īdim MatC:-2*sum ((L2-
  L3)*L5)ĪMatC(1,1)
:2*C*sum ((L2-L3)*L6)ĪMatC(2,1)
:-2*C*A*sum ((L2-L3)*L6*L1)Ī
  MatC(3,1)
:{3,3}Īdim MatE
:2*sum L5%ĪMatE(1,1)
:2*sum ((L2-2*L3)*L6)ĪMatE(1,2)
:MatE(1,2)ĪMatE(2,1)
(Program LOGISTIC continued)
:2*A*sum ((2*L3-L2)*L6*L1)Ī
  MatE(1,3)
:MatE(1,3)ĪMatE(3,1)
:2*C*sum ((C*L6-2*(L2-L3)*L4*
  L5)*L6)ĪMatE(2,2)
:2*C*sum ((-C*A*L6+(2*A*L5*L4-
  1)*(L2-L3))*L6*L1)ĪMatE(2,3)
:MatE(2,3)ĪMatE(3,2)
:2*C*A*sum ((C*A*L6-(2*A*L5*L4-
  1)*(L2-L3))*L6*L1%)-ĪMatE(3,3)
:Outpt(3,2,"Computing ")
:-1*MatE,,*MatCĪMatD
:2*EĪF
:10ĪS
:-1Ī
:While (F>E) and (S>0)
:I+1Ī
:If I>5:Then
:0ĪS
:Else
:Outpt(4,2,"Computing ")
:Outpt(4,12,1)
:1*SĪS
:S*MatD+MatAĪMatB
:MatB(1,1)ĪC
:MatB(2,1)ĪA
:MatB(3,1)ĪB
:e^(-B*L1)ĪL4
:C*(1+A*L4),ĪL3
:sum (L3-L2)%ĪF
:End
:End
:Outpt(4,2," ")
:If S==0:Then
:Outpt(3,2,"Still working")
:-1*MatCĪMatD
:(MatCĪ*MatC)*(MatCĪ*MatE*MatC),,
  ĪMatB
:10*MatB(1,1)ĪS

```

```

:-1Í
:While (F>E) and (S>0)
:I+1Í
:If I>5:Then
:0ÍS
:Else
:Outpt(4,2,"Computing ")
:Outpt(4,11,I)
:.1*SÍS
:S*MatD+MatAÍMatB
:MatB(1,1)ÍC
:MatB(2,1)ÍA
:MatB(3,1)ÍB
:e^(-B*L1)ÍL4
:C*(1+A*L4),ÍL3
:sum (L3-L2)%ÍF
:End
:End
(Program LOGISTIC continued)
:Outpt(4,2," ")
:If S==0:Then
:Outpt(3,2,"No improvement")
:Else
:Outpt(3,2," ")
:End
:End
:End
:FÍE
:{0,0}ÍL6
:S*MatD(2,1)*MatA(2,1),ÍL6(1)
:S*MatD(3,1)*MatA(3,1),ÍL6(2)
:abs L6ÍL6
:max(L6)ÍR
:End
:{R,Y}
:y1=L/(1+A*e^(-B x))
:CÍL
:CILCD
:Disp "The model is"
:Disp "Y=L/(1+A*e^(-B x))"
:Outpt(4,2,"L=")
:Outpt(4,4,L)
:Outpt(6,2,"A=")
:Outpt(6,4,A)
:Outpt(7,2,"B=")
:Outpt(7,4,B)

```

```

LSLINE      • Program
:FnOff
:0ÍA:0ÍB:1ÍC
:y1=A+B x
:L1ÍxStat
:L2ÍyStat
:dimL xStatÍN
:CILCD
:Disp "You will next view"
:Disp "the data. Use tick"
:Disp "marks to guess the"
:Disp "slope and y-intercept"
:Disp "of best fit line."
:Disp "xScl=":Outpt(6,7,xScl)
:Disp "yScl=":Outpt(7,7,yScl)
:Pause
:Lbl A1
:Scatter
:Pause
:Disp ""

```

```

:Input "slope=",B
:Input "y intercept=",A
:1ÍK:0Íx:0Ís
:Lbl V
:xStat(K)Íx
:y1ÍY
:(yStat(K)-Y)%o+SÍs
:Line(xStat(K),yStat(K),x,Y)
:K+1ÍK
:If K≤N
:Goto V
:Pause
:Disp "SSE=",S
:Pause
:If C==2
:Goto W
:Input "Try again? Y(1) N(2) ",C
:If C==1
:Goto A1
:LinR
:ShwSt
:Pause
:DrawF RegEq
:Pause
:aÍA:bÍB
:1ÍK:0Íx:0Ís
:Goto V
:Lbl W
:FnOff

```

```

MDVAL      • Program
:Input "Function location? ",H
:dimL L1ÍN
:NÍdimL L2
:For(j,1,N,1)
:L1(j)Íx
:If H==1:y1ÍL2(j)
:If H==2:y2ÍL2(j)
:If H==3:y3ÍL2(j)
:If H==4:y4ÍL2(j)
:End
:L2

```

```

NUMINTGL   • Program
:CILCD
:Disp "Enter f(x) in y1"
:Disp ""
:Disp "Continue?"
:Menu(1,"Yes",YS,2,"No",NO)
:Lbl NO:Stop
:Lbl YS
:Disp ""
:Disp "Draw Pictures?"
:Menu(1,"Yes",YE,2,"No",NR)
:Lbl YE:1ÍH:Goto LE
:Lbl NR:2ÍH
:Lbl LE
:CILCD
:Input "Left endpoint? ",A
:Input "Right endpoint? ",B
:If H==1:Then
:AÍxMin:BÍxMax
:iPart ((B-A)/20)ÍW
:If W==0:0.1ÍW
:seq(V,V,A,B,W)ÍL5
:dimL L5ÍN:NÍdimL L6
:For(j,1,N,1)
:L5(j)Íx:y1ÍL6(j)
:End
:real L6ÍL6
:min(L6)ÍyMin
:If yMin>0:0ÍyMin
:max(L6)ÍyMax
:If yMax<0:0ÍyMax
:WÍxScl
:iPart ((yMax-yMin)/10)ÍyScl
:0ÍdimL L5:0ÍdimL L6

```

```

:End
:Lbl A0
:CILCD
:Disp "Enter Choice:"
:Disp "Left Rect (1)"
:Disp "Right Rect (2)"
:Disp "Trapezoids (3)"
:Input "Midpt Rect (4) ",R
:Lbl A1
(Program NUMINTGL continued)
:CIDrw
:Disp ""
:Input "N? ",N
:(B-A)/NÍW
:0ÍS:1ÍC
:Lbl A2
:If R==1:Goto A3
:If R==2:Goto A4
:If R==3:Goto A3
:If R==4:Goto A5
:Lbl A3
:A+(C-1)WÍx
:xÍJ:x+WÍL
:Goto A7
:Lbl A4
:A+C*WÍx
:x-WÍJ:xÍL
:Goto A7
:Lbl A5
:If H≠1:Then
:If N>5:Then
:1ÍZ:W/2ÍH:AÍx
:Lbl A8
:x+HÍx:y1+SÍs
:A+Z*WÍx
:IS>(Z,N):Goto A8
:S*WÍs:Goto T
:End:End
:A+C*W-W/2Íx
:x-W/2ÍJ
:x+W/2ÍL
:Goto A7
:AÍG:G+WÍG:GÍV
:Lbl A9
:VÍx:y1ÍY:V+WÍx
:4Y+2y1+SÍs
:V+2*WÍV
:If V<B:Goto A9
:G-WÍx:y1ÍE
:BÍx:y1ÍF
:(W/3)*(S+E-F)Ís
:Goto T
:Lbl A7
:y1ÍK:K+SÍs
:If H==1:Goto D
:Lbl I
:IS>(C,N)
:Goto A2
:If R==3:Then
:AÍx:y1ÍP
:BÍx:y1ÍQ
:S+(Q-P)/2Ís
:End
:W*SÍs
:Lbl T
:Disp "SUM=",S
:Pause
(Program NUMINTGL continued)
:CILCD
:Lbl E
:CILCD
:Disp "Enter Choice:"
:Disp "Change N (1)"
:Disp "Change Method (2)"
:Input "Quit (3) ",T
:If T==1:Goto A1
:If T==2:Goto A0
:If T==3:Goto F
:Lbl F
:Stop
:Lbl D
:If R==3:Then
:xÍI:LÍx
:y1ÍM:ÍÍx
:Else:KÍM
:End
:Line(J,0,J,K)
:Line(J,K,L,M)
:Line(L,M,L,0)
:If C==N:Pause
:Goto I

```

```

:CIDrw
:Disp "from the right"
:Lbl RU
:Disp "approach tangent"
:Disp "line"
:Pause
:(xMax-xMin)/3ÍK
:If K>50:48ÍK
:For(J,1,5,1)
:A-KÍx
:If R==1:A+KÍx:xÍD
:y1ÍB:AÍx:y1ÍC
:(B-C)/(D-A)ÍM
:AÍx:y1ÍE
:DrawF (M(x-A)+E)
:K/2ÍK
:End
:Pause
:If R==1:Goto RV
:1ÍR:Goto RT
:Lbl RV
:CILCD
:Disp "Press ENTER to"
:Disp "see tangent line"
:Pause
:CIDrw
:TanLn(y1,A)
:Lbl NO:Stop

```

```

SECTAN      • Program
:CILCD
:CIDrw:2ÍR
:Disp ""
:Disp "Have f(x) in y1 and"
:Disp "draw graph of f"
:Disp ""
:Disp "Continue? "
:Menu(1,"Yes",YS,2,"NO",NO)
:Lbl YS
:Disp ""
:Disp "x-value of point"
:Input "of tangency? ",A
:Lbl RT
:Disp ""
:Disp "Press ENTER to "
:Disp "see secant lines"
:If R==1:Goto RS
:Disp "from the left"
:Goto RU
:Lbl RS

```

```

SINREG      • Program
:CILCD
:Disp "Have data in L1,L2"
:Disp ""
:Disp "Enter continues"
:Pause
:CILCD
:dimL L1N
:If N≠dimL L2:Then
:Disp "Lists are of unequal"
:Disp "length. Check data."
:Stop
:End
:0ÍP
:Repeat P>0
:Input "Period Guess? ",P
:End
:Disp "Maximum"
:Input "Iteration? ",M
:max(min(M,16),1)ÍM
:0ÍA
:2π/PÍB
:0ÍC
:OneVar L2:»ÍD
:(10-10)*sum (L2-D)%0ÍP
:13ÍdimL L3
:For(I,1,M)
:Fill(0,L3)
:For(K,1,N)
:{B*L1(K)}ÍL4
:{cos L4(1),sin L4(1)}ÍL4
:{L4(1),L4(2),L1(K)*(C*L4(1)-
A*L4(2)),A*L4(1)+C*L4(2)+
L2(K)}ÍL4
:{L4(1)%0,L4(1)*L4(2),L4(1),L4(
1)*L4(3),L4(1)*L4(4),L4(2)%0,
L4(2),L4(2)*L4(3),L4(2)*L4(4)
,L4(3),L4(4),L4(3)%0,L4(3)*L4(
4)}+L3ÍL3
:End
:[L3(1),L3(2),L3(3),L3(4),L3(
5)][L3(2),L3(6),L3(7),L3(8),
L3(9)][L3(3),L3(7),N,L3(10)
,L3(11)][L3(4),L3(8),L3(10),
L3(12),L3(13)]ÍMatA
:For(K,1,4)
:For(J,K+1,4)
:If abs MatA(J,K)>abs MatA(K,K)
:Then
:rSwap(MatA,K,J)
:End:End
:If MatA(K,K)≠0:Then

```

D-

```

:multR(1/MatA(K,K),MatA,K)ÍMatA
:For(J,1,4)
:If J≠K
:mRAdd(-MatA(J,K),MatA,K,J)ÍMatA
:End:End:End
:Disp I
:If I>1 and MatA(4,4)=0:Then
:MÍI
:Else
(Program SINREG continued)
:A-MatA(1,5)ÍA
:B-MatA(4,5)ÍB
:C-MatA(2,5)ÍC
:D-MatA(3,5)ÍD
:L3(5)*MatA(1,5)+L3(9)*MatA(2,5)
:L3(11)*MatA(3,5)+L3(13)*MatA
(4,5)ÍK
:If K<P:MÍI
:End:End
:AÍP
:√(P%0+C%0)ÍA
:If P<0:Then
:-.5*π-tan,, (C/P)ÍC
:Else
:.5*π-tan,, (C/P)ÍC
:End
:y1=A*sin (B x+C)+D
:0ÍdimL L3
:0ÍdimL L4
:CILCD
:Disp "The model is"
:Disp "Y=A sin (B x+C)+D"
:Outpt(4,2,"A=")
:Outpt(4,4,A)
:Outpt(5,2,"B=")
:Outpt(5,4,B)
:Outpt(6,2,"C=")
:Outpt(6,4,C)
:Outpt(7,2,"D=")
:Outpt(7,4,D)

```

```

STPLT      • Program
:dimL L1N
:min(L1)ÍA1
:max(L1)ÍB1
:min(L2)ÍC1
:max(L2)ÍD1

```

```

:(B1-A1)/10ÍX1:(D1-C1)/10ÍY1
:A1-X1ÍxMin:B1+X1ÍxMax
:C1-1.5*Y1ÍyMin:D1+Y1ÍyMax
:0ÍxScI
:0ÍyScI
:(xMax-xMin)/125.5ÍP1
:(xMax-xMin)/128.5ÍP2
:(yMax-yMin)/62ÍP3
:For(K,1,N,1)
:L1(K)-P2ÍW1
:L1(K)+P1ÍW2
:L2(K)-P3ÍH1
:L2(K)+P3ÍH2
:Line(W1,H2,W2,H2)
:Line(W2,H2,W2,H1)
:Line(W2,H1,W1,H1)
:Line(W1,H1,W1,H2)
:End

```

```

:Disp " "
:Disp "Press right arrow to "
:Disp "scroll through table."
:Pause
:" "
:round(Z,5)ÍZ
:Z

```

TABLE • Program

```

:CILCD
:Disp "Have function(s) in"
:Disp "y(x)= list."
:Func
:1Íy
:Disp "Enter 1 (AUTO) or"
:Input "2 (ASK) ",W
:If W==2:Then
:Prompt x
:xÍA:xÍB:1ÍH
:Goto J:End
:Input "TblMin? ",A
:Input "ΔTbl? ",H
:Input "Number of values? ",V
:(V-1)*H+AÍB
:Lbl J
:For(x,A,B,H)
:eval xÍN
:dimL NÍD
:{y,D}Ídim Z
:For(C,1,D)
:(x,N(C))ÍZ(y,C)
:End
:y+1Íy
:End
:CILCD
:Disp "Press ENTER to see"
:Disp "[input, output]."
:Disp "1st column is for y1,"
:Disp "2nd column for y2,..."

```

