



Appendix B

Program Listings

This appendix contains the full program listings for the programs referred to in this book. You can enter the listings directly into your graphing handheld or download them from our Web site, **education.ti.com**. Once the program is on your device, you should test it to be sure it executes correctly. Transfer the program to your students' devices using unit-to-unit cables and the TI Connect™ software, or the TI-Navigator™ system. At the back of this appendix you will find a table detailing the commands associated with entering these programs into TI devices.

Euler's Method Program

Name of Program: **EULER**

For Use With: **Activity 14: Using Slope Fields**

Available for Download: **Yes, at: <ftp://ftp.ti.com/pub/graph-ti/calc-apps/>**

```
ClrHome
```

```
Disp "INITIAL CONDITION"
```

```
Input "X0 = ",A
```

```
Input "Y0 = ",B
```

```
Disp "FINAL X "
```

```
Input "X = ",C
```

```
Disp "STEP SIZE?"
```

```
Input "H = ",H
```

```
If (abs((C-A)/(C-A))≠abs(H/H))
```

```
-H→H
```

```
-int((-C-A)/H)→N
```

```
N+1→dim(L1)
```

```
N+1→dim(L2)
```

```
N+1→dim(L3)
```

```
A→X
B→Y
Disp "SHOW STEPS?"
Disp "0=NO, 1=YES"
Input Z
For (I,1,N+1,1)
If Z
Then
Disp [[X,Y]]
Pause
End
X→L1(I)
Y→L2(I)
Y1→L3(I)
Y+H*Y1→Y
X+H→X
End
PlotsOff
FnOff
Plot1(xyLine,L1,L2,+)
PlotsOn 1
ZoomStat
```

Numeric Integration Program

Name of Program: **NUMINT**

For Use With: **Activity 15: Approximating Integrals with Riemann Sums**

Available for Download: **Yes, at: <ftp://ftp.ti.com/pub/graph-ti/calc-apps/>**

```
FnOff:ClrDraw
```

```
DrawF Y1
```

```
StorePic Pic6
```

```
Input "LOWER LIMIT",A
```

```
Input "UPPER LIMIT",B
```

```
4→dim(L6)
```

```
Lbl 8
Menu("NUMINT METHOD", "LEFT", 2, "RIGHT", 3, "MIDPT", 4,
"TRAPEZOID", 5, "QUIT", 6)
Lbl 2:0→R:1→Z
Goto 7
Lbl 3:1→R:2→Z
Goto 7
Lbl 4:.5→R:3→Z
Goto 7
Lbl 5:0→R:4→Z
Goto 7
Lbl 6:Stop
Goto 8
Lbl 7
Input "NUM.SUBINTERVALS", N
While N≠0
ClrDraw
RecallPic Pic6
(B-A)/N→H
A+RH→X
A→L
0→T
If (H ≤ (2*ΔX))
Then
For (I, A, B, ΔX)
Line (I, Y1(I), I, 0)
End
End
For (I, 1, N)
Y1→C
X+H→X:Y1→D
L+H→L
```

```
If (H>(2*ΔX))
Then
If Z=4
Then
Line(L-H,C,L,D):Line(L-H,C,L-H,0):Line(L,D,L,0)
Else
Line(L-H,C,L-H,0)
Line(L-H,C,L,C):Line(L,C,L,0)
End
End
If (Z=4)(I≠1)
Then
T+2C→T
Else
T+C→T
End
If Z=4
Then
(T+D)/2→T
End
End
Pause
Disp "AREA=",TH
TH→L6(Z)
Input "NUM. SUBINTERVALS",N
End
Goto 8
```

Slope Fields ProgramName of Program: **SLPFLD**For Use With: **Activity 14: Using Slope Fields**Available for Download: **Yes, at: <ftp://ftp.ti.com/pub/graph-ti/calc-apps/>**

8→L:12→W

FnOff

 $(Y_{\max} - Y_{\min}) / L \rightarrow V$ $(X_{\max} - X_{\min}) / W \rightarrow H$ $Y_{\min} + V/3 \rightarrow Y$

For (R, 1, L)

 $X_{\min} + H/3 \rightarrow X$

For (C, 1, W)

Y1→M

 $-M \cdot H/3 + Y \rightarrow S$ $M \cdot H/3 + Y \rightarrow T$

If abs(T-S) > V

Then

 $Y + V/3 \rightarrow T$ $Y - V/3 \rightarrow S$ $(T - Y) / M + X \rightarrow Q$ $(S - Y) / M + X \rightarrow P$

Else

 $X - H/3 \rightarrow P$ $X + H/3 \rightarrow Q$

End

Y→U:Line(P,S,Q,T):U→Y

X+H→X

End

Y+V→Y

End

The following table is a reference for entering the program commands used in the **EULER**, **NUMINT**, and **SLPFLD** programs.

Command	Selection path
Name of Program	PRGM [NEW] 1:Create New ; type the program name ENTER
abs(MATH [NUM] 1:abs(
ClrDraw	2nd [DRAW] 1:ClrDraw
ClrHome	PRGM [I/O] 8:ClrHome
dim(2nd [MATRIX] [MATH] 3:dim(
Disp	PRGM [I/O] 3:Disp
DrawF	2nd [DRAW] 6:DrawF
Else	PRGM [CTL] 3:Else
End	PRGM [CTL] 7:End
FnOff	VARS [Y-VARS] 4:On/Off 2:FnOff
For(PRGM [CTL] 4:For(
Goto	PRGM [CTL] 0:Goto
If	PRGM [CTL] 1:If
Input	PRGM [I/O] 1:Input
int(MATH [NUM] 5:int(
Lbl	PRGM [CTL] 9:Label
Line(2nd [DRAW] 2:Line(
Menu(PRGM [CTL] C:Menu(
Pause	PRGM [CTL] 8:Pause
Plot1(2nd [STAT PLOT] 1:Plot1(
PlotsOff	2nd [STAT PLOT] 4:PlotsOff
PlotsOn	2nd [STAT PLOT] 5:PlotsOn
StorePic	2nd [DRAW] [STO] 1:StorePic
Then	PRGM [CTL] 2:Then
Stop	PRGM [CTL] F:Stop
While	PRGM [CTL] 5:While
Xmax	VARS 1:Window 2:Xmax
Xmin	VARS 1:Window 1:Xmin
xyLine	2nd [STAT PLOT] [TYPE] 2:xyLine
Y1	VARS [Y-VARS] 1:Function 1:Y1
Ymax	VARS 1:Window 5:Ymax
Ymin	VARS 1:Window 4:Ymin
ZoomStat	ZOOM [ZOOM] 9:ZoomStat