COMMON TI–83, TI-84 PROGRAM EXPRESSIONS

KEY IN	DISPLAY	EXPLANATION
2nd ALPHA word	WORD	Note that the letters are capitalized when displayed.
PRGM → 3	Disp	Display whatever follows, in quotes.
PRGM → 1	Input	As the program is executed, a ? appears, and then we need to key in a number for A.
PRGM 9 1	Lbl 1	The start of a loop
αL STO X,T,θ,n	L →X	The number L is stored in the location X.
PRGM 0 1	Goto 1	Tells the program to go to Label 1.
PRGM A αJ , αN)	IS > (J,N)	Increases J one "incremental step," then compares J with N. If J > N, the program skips the next step.

Note that α denotes the ALPHA key

TI–83, TI-84 PROGRAM FOR LEFT SUMS

(The above expressions are in italics; press ENTER at the end of each line.)

PRGM →→ ENTER RIEMANN	Prgm 1: RIEMANN	Program named RIEMANN
VARS → 4 2	FnOff	Deselects all Y= functions
Disp 2nd α "LOWERLM"	Disp "LOWERLM"	Lower limit of integration
Input αA	Input A	After ?, type in the lower limit of integration
Disp 2nd α "UPPERLM"	Disp "UPPERLM"	Upper limit of integration
Input αB	Input B	After ?, type in the upper limit of integration
Disp 2nd α "N SUBINT"	Disp "N SUBINT"	Number of subintervals for [A, B] is N
Input αN	Input N	After ?, type in the number of subintervals
0 STO αL	0→L	0 is stored in location L
(αB – αA) ÷ αN STO αH	(B – A)/N → H	Subinterval width (B–A)/N is stored in location H
1 STO αJ	1 → J	1 is stored in location J
Lbl 1	Lbl 1	Start of loop
Y1(αA+(αJ–1)αH)*αH+αL STO αL	Y1(A+(J–1)H)*H+L→L	Left subinterval endpoint stored in location L
IS > αJ , αN)	IS > (J,N)	Increment J one step. If J>N, skip next command
Goto 1	Goto 1	Program returns to Lbl 1 and loops again
Disp αL	Disp L	Program's last line, which displays L

To execute the program in order to evaluate $\int_A^B f(x)dx$, do the following:

2nd CLEAR (to quit the program) Y= (key in your function) ENTER 2nd QUIT PRGM # ENTER

Key in A ENTER (for lower limit), B ENTER (for upper limit), N ENTER (for number of intervals into which [A, B] is divided). The display reads the left sum for the integral. To execute the program again, key in ENTER .

How can you compute right sums? Midpoint sums?

COMMON TI–86 PROGRAM EXPRESSIONS

We will write α for the ALPHA key.

KEY IN	DISPLAY	EXPLANATION
αα word	WORD	Locks into the alphabet key.
I/O MORE MORE "	"	Quotation mark
αL STO x-VAR	L → X	The number L is stored in location X.

TI–86 PROGRAM FOR LEFT SUMS

(Press ENTER at the end of each line.)

PRGM NAMES EDIT RIEMANN	Prgm 1: RIEMANN	Program named "RIEMANN"
I/O Disp "ααLOWERLM"	Disp "LOWERLM"	Lower limit of integration
Input αA	Input A	After ?, type in the lower limit of integration
Disp "ααUPPERLM"	Disp "UPPERLM"	Upper limit of integration
Input αB	Input B	After ?, type in the upper limit of integration
Disp "ααN (–) SUBINT"	Disp "N SUBINT"	Number of subintervals for [A, B] is N
Input αN	Input N	After ?, type in the number of subintervals
0 STO L	0 → L	the number 0 is stored in location L
(αB – αA) ÷ αN STO H	(B – A)/N → H	Subinterval width (B–A)/N is stored in location H
1 STO J	1 → J	1 is stored in location J
2nd CTL For αJ , 1 , N	For (J,1,N	Start of loop
y1(αA + (αJ – 1)αH)αH + αL STO αL	y1(A+(J–1)H)H+L → L	Compute y1 at left endpoint, multiply by H and add to value in L, then store in L
End	End	Program returns to CTL line and loops again
2nd I/O Disp αL	Disp L	Program's last line, which displays L

To execute the program in order to evaluate $\int_A^B f(x)dx$, do the following:

2nd CLEAR (to quit the program) GRAPH y(x)= (key in your function) 2nd QUIT PRGM NAMES LEFTSUM ENTER

Key in A ENTER (for lower limit), B ENTER (for upper limit), N ENTER (for number of intervals into which [A, B] is divided). The display reads the left sum for the integral. To execute the program again, key in ENTER .

How can you compute a midpoint sum? A right sum?

COMMON TI–89 PROGRAM EXPRESSIONS

In the instructions below, α denotes the ALPHA key.

KEY IN	DISPLAY	EXPLANATION
αα word	WORD	Locks into the alphabet key
2nd 1	"	Quotes (needed at beginning of all text to be displayed)
α (-)		Produces a space in text
αL STO x-VAR	L → X	The number L is stored in location X
F3 2	Display	
F3 3	Input	

TI–89 PROGRAM FOR LEFT SUMS

(Press ENTER at the end of each line.)

APPS 7 3 (arrows down to variable) riemann()	riemann()	Program named riemann()
Display " αα LOWERLM"	Disp "lowerlm"	Lower limit of integration
Input αA	Input a	After ?, type in the lower limit of integration
Disp "αα UPPERLM"	Disp "upperlm"	Upper limit of integration
Input αB	Input b	After ?, type in the upper limit of integration
Disp "ααN SUBINT"	Disp "n subint"	Number of subintervals for [a, b] is n
Input αN	Input n	After ?, type in the number of subintervals
0 STO αL	0 →l	the number 0 is stored in location l (letter l)
(αB – αA) ÷ αN STO H	(b – a)/n → h	Subinterval width (b–a)/n is stored in location h
1 STO J	1 → j	The number 1 is stored in location j
F2 4 αJ , 1 , N	For (J,1,N	Start of loop (also enters line EndFor)
y1(αA + (αJ – 1)αH) αH + αL STO αL	y1(a+(j–1)h)h+l → l	Compute y1 at left endpoint, multiply by h and add to value in l, then store in l
F2 EndFor	EndFor	Program returns to CTL line and loops again. This line is already in the program]
Move cursor to end of EndFor line and press ENTER		
Disp " αα LOWER SUM "	"lower sum"	Label for lower sum
I/O Disp αL	Disp l	Program's last line, which displays L

Enter the function in the Y= menu as y1. From the Home screen type in the name of the program riemann() (you must include the parentheses). After the prompt for each input, enter the values for a, b, and n followed by ENTER.

What changes do you need to make to compute right sums? Midsums?