TI–89 PROGRAM: SIMPSON'S RULE and TRAPEZOIDAL RULE

To begin: ON APPS 7 (for Program Editor 3 (for New) <u>NOTE</u>: Press ENTER at the end of each line!
Type needs to be Program Variable needs to be the title of the program, say Simpson
Then start typing after the Prgm line and before the EndPrgm line.

When you type in the program, Disp comes from F3 2; Input comes from F3 2 ÷ is divides, not sum (+)
For…EndFor comes from F2 4 STO is a key α stands for the alpha key 2nd α locks the alpha key

KEY IN	DISPLAY	EXPLANATION
Disp 2nd "2nd α lower limit"	Disp "lower limit"	Lower limit of integration
Input αa	Input a	After ?, type in the lower limit of integration
Disp 2nd "2nd α upper limit"	Disp "upper limit"	Upper limit of integration
Input αb	Input b	After ?, type in the upper limit of integration
Disp 2nd "2nd α n subintervals"	Disp "n subintervals"	Number of subintervals for [a,b] is n
Disp 2nd "2nd α enter even n"	Disp "enter even n"	The even integer n is to be entered.
Input αn	Input n	After ?, type in n
0 STO αs	0→ s	The number 0 is stored in location s (for Simpson)
0 STO αv	0→v	The number 0 is stored in location v (for Trapezoidal)
(αb – αa) ÷ αn STO αw	(b – a)/n→w	Subinterval width (b–a)/n is stored in location w
For αj,1, αn/2	For j,1,n/2	Start of loop, where j step increases from 1 to n/2
αa + 2(αj – 1)* αw STO αp	a+2(j–1)*w→p	Left endpoint of jth subinterval stored in location p
αa + 2αj * αw STO α r	a+2j*w→ r	Right endpoint of jth subinterval stored in location r
(αp + αr) ÷ 2 STO αm	(p + r)/2→m	Midpoint of jth subinterval stored in location m
y1(αp) STO αp	y1(p) → p	y1(p) is stored in location p
y1(αr) STO αr	y1(r) → r	y1(r) is stored in location r
y1(αm) STO αm	y1(m) → m	y1(m) is stored in location m
αs+αw*(αp+4αm+αr) ÷3 STO αs	s+w*(p+4m+r)/3→ s	Jth stage sum for Simpson's Rule is stored in s
αv+αw*(αp+2αm+αr) ÷2 STO αv		v+w*(p+2m+r)/2→ v Jth stage sum for
Trapezoidal Rule is stored in		EndFor End of loop
Disp 2nd "2nd α simpson rule"	Disp "simpson rule"	Prepares for the Simpson Rule approximation
Disp αs	Disp s	Displays Simpson's Rule approximation
Disp 2nd "2nd α trapezoidal rule"	Disp "trapezoidal rule"	Prepares for the Trapezoidal Rule approximation
Disp v	Disp v	Displays the Trapezoidal Rule approximation
	EndPrgm	End of the program

To execute the program in order to evaluate $\int_0^2 x^2\,dx$, do the following: 2nd QUIT (to quit the program)
Then key in your function f(x) into y1 (from y= above F1 key) Then ENTER 2nd QUIT
On the main line, type: αα simpson() ENTER

The display reads "lower limit ?" Key in a ENTER (gives the lower limit of integration)

The display reads "upper limit ?"	Key in	b	ENTER	(gives the upper limit of integration)
The display reads "enter even n ?"	Key in	n	ENTER	(gives the number of subintervals)

Then the display reads:

"simpson rule" and the approximation appears below.

"trapezoidal rule" and the approximation appears below.