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

To begin: ON APPS 7 (for Program Editor 3 (for New) NOTE: 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)

(b – a)/n→w Subinterval width (b–a)/n is stored in location w

For j,1,n/2 Start of loop, where j step increases from 1 to n/2
αa+2j(αj-1)*αw STO αp a+2(j-1)*w→p Left endpoint of jth subinterval stored in location p
αa+2j*αw STO αr a+2j*w→ r Right endpoint of jth subinterval stored in location r

(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

s+w*(p+4m+r)/3→ s Jth stage sum for Simpson's Rule is stored in s

v+w*(p+2m+r)/2→ v Jth stage sum for Trapezoidal Rule is stored in v

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 (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.