# TI-82 PROGRAM: SIMPSON’S RULE & TRAPEZOIDAL RULE

**KEY IN**                               **DISPLAY**                             **EXPLANATION**

PRGM ➢ ➢ ➢ ENTER SIMPSON                Prgm:1: SIMPSON  Program named “SIMPSON”

2nd VARS 5 2                            FnOff  Deselects all functions

Disp 2nd α “LOWERLIMIT”                 Disp “LOWERLIMIT”  Lower limit of integration

Input αA                                Input A  After ?, type in the lower limit of integration

Disp 2nd α “UPPERLIMIT”                 Disp “UPPERLIMIT”  Upper limit of integration

Input αB                                Input B  After ?, type in the upper limit of integration

Disp 2nd α “SUBINTERVALS”               Disp “N SUBINTERVALS”  Number of subintervals for [A, B] is N

Disp 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

ν STO αS                                ν → S  0 is stored in location S (for Simpson’s Rule)

ν STO αV                                ν → V  0 is stored in location V (for the Trapezoidal Rule)

(νB–νA)/νN → νW                          (B–A)/N → W  Subinterval width (B–A)/N stored in location W

1 STO αJ                                1 → J  1 is stored in location J

Lbl 1                                   Lbl 1  Start of loop


αA + 2αJαW STO αR                       A + 2JW → R  Right endpoint of [A+2(j–1)W, A+2jW] stored in R

(αL + αR)/2 → STO αM                    (L + R)/2 → M  Midpoint of [A+2(j–1)W, A+2jW] stored in M

αL STO X,T,θ                            L → X  L is stored in location X

2nd VARS 1 1 STO αL                     Y₁ → L  Y₁(L) is stored in location L

αM STO X,T,θ                            M → X  M is stored in location X

2nd VARS 1 1 STO αM                     Y₁ → M  Y₁(M) is stored in location M

αR STO X,T,θ                            R → X  R is stored in location X

2nd VARS 1 1 STO αR                     Y₁ → R  Y₁(R) is stored in location R

αW(αL+4αM+αR)/3 + νS STO αS             W(L+4M+R)/3 + S → S  New sum is stored in location S (for Simpson’s Rule)

αW(αL+2αM+αR)/2 + νV STO αV             W(L+2M+R)/2 +V → V  New sum is stored in location V (for Trapezoidal Rule)

IS > (νJ , νN/2)                         IS > (J,N/2)  Increment J one step. If J>N/2, skip next command

Goto 1                                  Goto 1  Program returns to Lbl 1 and loops again


Disp αS                                 Disp S  Displays the Simpson’s Rule approximation S


Disp αV                                 Disp V  Displays the Trapezoidal Rule approximation V

To execute the program in order to evaluate \( \int_{a}^{b} f(x) \, dx \), do the following: 2nd QUIT (to quit the program)

Y= key in your function f(x)  ENTER  2nd QUIT  PRGM (choose the program)  ENTER

The display reads LOWERLIMIT, ?  Key in A  ENTER (gives the lower limit of integration)

The display reads UPPERLIMIT, ?  Key in B  ENTER (gives the upper limit of integration)

The display reads ... ENTER N, ?  Key in N  ENTER (gives number of subinterval of [A, B])

To execute the program again, just key in ENTER

Identification of italicized words in the program:  Input (PRGM ➢ 1)  Display (PRGM ➢ 3)

Label (PRGM 9)  Goto (PRGM φ)  IS > (PRGM αA)

φ represents zero (distinguished from the letter 0)  If you type αφ then you get a "space" (between two words)