

Simpsons Rule -2

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Select TABLE mode from the main menu by using the arrow keys to highlight the TABLE icon or pressing 7.



Note: Area = $\frac{1}{3}h[y_0 + 2y_1 + 4y_2 + 2y_3 + \dots + 4y_{n-2} + 2y_{n-1} + y_n]$
Where $h = \frac{x_n - x_0}{n}$

The number of steps for using **Simpsons Rule** has to be even.

You can remember what is inside the

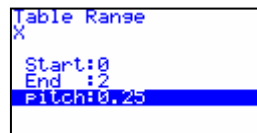
$[y_0 + 2y_1 + 4y_2 + 2y_3 + \dots + 4y_{n-2} + 2y_{n-1} + y_n]$ by the sequence: **1 2 4 2 4 2 2 4 2 4 2 1**

Example: Calculate the area bounded by the x-axis and the curve $y = x.e^x$ between $x = 0$ and $x = 2$, in steps of 0.25.

Answer: Enter **TABLE** mode and enter in the Function:
 $x.e^x$ in the Y1 space and
 $2(x.e^x)$ in the Y2 space.
 $4(x.e^x)$ in the Y3 space



Select **F5 RANGE** to enter $x = 0$, the **Start** value and $x = 2$, the **End** value and **pitch** to 0.25, being the step length. Then **EXIT**.



To create the table of values, x, Y1, Y2 and Y3 press the **F6** key

X	Y1	Y2	Y3
0	0	0	0
0.25	0.321	0.642	1.284
0.5	0.8243	1.6487	3.2974
0.75	1.5877	3.1755	6.351

X	Y1	Y2	Y3
1	2.7182	5.4365	10.873
1.25	4.3629	8.7258	17.451
1.5	6.7225	13.445	26.89
1.75	10.07	20.141	40.282

X	Y1	Y2	Y3
1.25	4.3629	8.7258	17.451
1.5	6.7225	13.445	26.89
1.75	10.07	20.141	40.282
2	14.778	29.556	59.112

Reading off the required values from Y1:

$$\begin{aligned} \text{Area} &= \frac{1}{3} \times 0.25 \times [0 + 2 \times 0.321 + 4 \times 0.824 + 2 \times 1.588 + 4 \times 2.718 + 2 \times 4.363 + \\ & 4 \times 6.723 + 2 \times 10.07 + 14.778] \\ &= 0.08333 \times [0 + 0.642 + 3.297 + 3.176 + 10.873 + 8.726 + 26.89 + 20.14 + 14.778] \\ &= 0.08333 \times 88.562 \\ &= 7.38 \text{ sq units} \end{aligned}$$

OR reading off the required values from Y1 and Y2:

$$\begin{aligned} \text{Area} &= \frac{1}{2} \times 0.25 \times [0 + 0.642 + 1.648 + 3.176 + 5.436 + 8.726 + 13.446 + 20.14 + 14.778] \\ &= 0.08333 \times [0 + 0.642 + 3.297 + 3.176 + 10.873 + 8.726 + 26.89 + 20.14 + 14.778] \\ &= 0.08333 \times 88.562 \\ &= 7.38 \text{ sq units} \end{aligned}$$

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