

Trapezium rule using LIST mode.

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Select LIST mode from the main menu by using the arrow keys to highlight the LIST icon or pressing 4.



$$\text{Note: Area} = \frac{1}{2}h[y_0 + 2y_1 + 2y_2 + \dots + 2y_{n-1} + y_n]$$

$$\text{Where } h = \frac{x_n - x_0}{n}$$

Also known as the trapezoidal rule

Example: Calculate the area under the curve $y = x^2$ between $x = 1$ and $x = 3$, using a step length of $\frac{1}{2}$ using the trapezoidal rule.

Making a table of values gives:

X	Y
1	1
1.5	2.25
2	4
2.5	6.25
3	9
3.5	12.25
4	16
4.5	20.25
5	25



Enter the x values into List 1
Then move the cursor so that it is 'sitting' on top of List 2 (as shown), then press **OPTN F1** and **F1** again to place List on the screen. Then type **1** then press the x^2 button then **EXE**.



Then move the cursor so that it is 'sitting' on top of List 2 (as shown below)
Type $2 \times \text{List } 2$ then **EXE**



Then delete the 'middle' entries in list 2 and the 'end' entries in list 3.

So, in List 2 you have y_0 and y_n ,

In List 3 you have y_1, y_2, \dots, y_{n-1}

Now, in List 4 type in $0.5 \times 0.5 \times (\text{SumList 2} + \text{SumList 3})$ then **EXE**

List 1	List 2	List 3	List 4
1	1	1	4.5
2	1.5	25	8
3	2	12.5	18
4	2.5	18	24.5
5	3		

List 1	List 2	List 3	List 4
4	2.5		18
5	3		24.5
6	3.5		32
7	4		40.5
8	4.5		

List 1	List 2	List 3	List 4
1	1	1	4.5
2	1.5	25	8
3	2	12.5	18
4	2.5	18	24.5
5	3		

List 1	List 2	List 3	List 4
1	1	1	4.5
2	1.5	25	8
3	2	12.5	18
4	2.5	18	24.5
5	3		

List 1	List 2	List 3	List 4
1	1	1	4.5
2	1.5	25	8
3	2	12.5	18
4	2.5	18	24.5
5	3		

List 1	List 2	List 3	List 4
1	1	1	4.5
2	1.5	25	8
3	2	12.5	18
4	2.5	18	24.5
5	3		

List 1	List 2	List 3	List 4
1	1	1	4.5
2	1.5	25	8
3	2	12.5	18
4	2.5	18	24.5
5	3		

List 1	List 2	List 3	List 4
1	1	1	41.5
2	1.5	25	8
3	2	12.5	18
4	2.5	18	24.5
5	3		

OPTN

F1

F6

F6

then **F1**
for **List**

then **F1**
for **Sum**

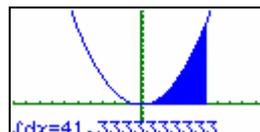
$$\text{Area} = \frac{1}{2}h[y_0 + 2y_1 + 2y_2 + \dots + 2y_{n-1} + y_n]$$

Actual answer is:

$\int(x^2, 1, 5)$	41.33333333
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$$\text{Area} = 41 \frac{1}{3} \text{ sq units}$$

N.B. The trapezium rule has over estimated the actual area as the graph of $y = x^2$ is 'convex up'



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