Area under Tabulated Data (Trapezoidal and Simpson's Rule)

Integral of equally spaced tabulated values (up to nine) by the trapezoidal rule and Simpson's rule, for areas, volumes and totals from readings.

Method: Trapezoidal rule; Simpson's one-third rule

Input parameters

Unit system: SI

Parameter	Value	Unit
Number of ordinates (Simpson needs an odd number)	7.0000	
Spacing between ordinates	2.0000	
Ordinate 1	0	
Ordinate 2	2.1000	
Ordinate 3	3.6000	
Ordinate 4	4.4000	
Ordinate 5	4.6000	
Ordinate 6	4.0000	
Ordinate 7	2.8000	
Ordinate 8	0	
Ordinate 9	0	

Calculated results

Parameter	Value	Unit
Trapezoidal rule	40.200	
Simpson's rule (trapezoidal if the count is even)	40.800	

Formula and method

$$I_T = h\left[\frac{y_0 + y_n}{2} + \sum y_i\right], \quad I_S = \frac{h}{3}\left[y_0 + y_n + 4\sum y_{odd} + 2\sum y_{even}\right]$$

Variables

n	Number of ordinates (Simpson needs an odd number)	-
h	Spacing between ordinates	-
y_1	Ordinate 1	-
y_2	Ordinate 2	-
y_3	Ordinate 3	-
y_4	Ordinate 4	-
y_5	Ordinate 5	-
y_6	Ordinate 6	-
y_7	Ordinate 7	-
y_8	Ordinate 8	-
y_9	Ordinate 9	-
I_T	Trapezoidal rule	-
I_S	Simpson's rule (trapezoidal if the count is even)	-

Method and standards

Numerical integration.

Assumptions and limits

- Equally spaced ordinates.

References

- Trapezoidal rule; Simpson's one-third rule

Report details

Report reference	FCC-3PPV-B8BG (the same inputs always give the same reference)
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Release checks	2 reference cases of this calculator, computed independently, are checked on every release

Results are for engineering estimation. Verify critical designs against the referenced standards and your own data.

This calculator online

https://calc.firecad.com/general/geometry/numerical-integration

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.