Simpson's 3/8th Rule

Formula:

$$I = \frac{3h}{8}[f(x_0) + 3f(x_1) + 3f(x_2) + 2f(x_3) + 3f(x_4) + 3f(x_5) + 2f(x_6) + \ \ldots\ldots\ldots + 2f(x_{n-3}) + 3f(x_{n-2}) + 3f(x_{n-1}) + f(x_n)]$$

$\int_a^b f(x)\,dx$

$a = Lower\ Limit\ Integration$

$b = Upper\ Limit\ Integration$

$n = Number\ of\ equally\ spaced\ subintervals\ from\ a\ to\ b$

$h = x_{i+1} - x_i = \frac{b-a}{n}$

Note: *The value of n must be divisible by* 3

Example: *Calculate the value of integral* $\int_0^6 \frac{x+1}{2}\,dx$ *using* 6 *subintervels*

Solution: $h = \frac{b-a}{n} = \frac{6-0}{6} = 1$

	x_0	x_1	x_2	x_3	x_4	x_5	x_6
x	0	1	2	3	4	5	6
$f(x)$	0.5	1.0	1.5	2.0	2.5	3.0	3.5

$$I = \frac{3h}{8}[f(x_0) + 3f(x_1) + 3f(x_2) + 2f(x_3) + 3f(x_4) + 3f(x_5) + f(x_6)]$$

$$= \frac{(3 \times 1)}{8}[0.5 + (3 \times 1.0) + (3 \times 1.5) + (2 \times 2.0) + (3 \times 2.5) + (3 \times 3.0) + 3.5]$$

$$= \frac{3}{8}[0.5 + 3.0 + 4.5 + 4.0 + 7.5 + 9.0 + 3.5]$$

$$= \frac{3}{8} \times 32.0$$

$$= 12.0\ \ (Ans)$$