Simpson's 1/3rd Rule

Formula:

$$I = \frac{h}{3}[f(x_0) + 4f(x_1) + 2f(x_2) + 4f(x_3) + 2f(x_4) + \ \ldots\ldots\ldots + 2f(x_{n-2}) + 4f(x_{n-1}) + f(x_n)]$$

$$= \frac{h}{3}[f(x_0) + 4\{f(x_1) + f(x_3) + f(x_5) + \cdots + f(x_{n-1})\} + 2\{f(x_2) + f(x_4) + \cdots + f(x_{n-2})\} + f(x_n)]$$

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

$a = Lower\ Limit\ Integration$

$b = Upper\ Limit\ Integration$

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

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

Note: *The value of n must be divisible by* 2

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

$$I = \frac{h}{3}[f(x_0) + 4\{f(x_1) + f(x_3) + f(x_5)\} + 2\{f(x_2) + f(x_4)\} + f(x_6)]$$

$$= \frac{1}{3}[0.5 + 4\{1.0 + 2.0 + 3.0\} + 2\{1.5 + 2.5\} + 3.5]$$

$$= \frac{1}{3}[0.5 + 24.0 + 8.0 + 3.5]$$

$$= \frac{1}{3} \times 36.0$$

$$= 12.0\ \ (Ans)$$