

$$y' = f(x, y),$$

$$y(x_0) = y_0.$$

	<b>Simple, Low Order Methods</b>	<b>Error</b>
Explicit Euler:	$y_{n+1} = y_n + hf(x_n, y_n)$	$O(h)$
Implicit Euler:	$y_{n+1} = y_n + hf(x_{n+1}, y_{n+1})$	$O(h)$
Trapezoidal Method:	$y_{n+1} = y_n + \frac{h}{2} [f(x_n, y_n) + f(x_{n+1}, y_{n+1})]$	$O(h^2)$

	<b>Modified Euler Method</b>	<b>Error</b>
a) Predictor:	$y_{n+1}^p = y_n + hf(x_n, y_n)$	
b) Corrector:	$y_{n+1} = y_n + \frac{h}{2} [f(x_n, y_n) + f(x_{n+1}, y_{n+1}^p)]$	$O(h^2)$

	<b>Classical Runge–Kutta Method</b>	<b>Error</b>
set $k_1$ :	$k_1 = hf(x_n, y_n)$	
set $k_2$ :	$k_2 = hf(x_n + \frac{1}{2}h, y_n + \frac{1}{2}k_1)$	
set $k_3$ :	$k_3 = hf(x_n + \frac{1}{2}h, y_n + \frac{1}{2}k_2)$	
set $k_4$ :	$k_4 = hf(x_{n+1}, y_n + k_3)$	
	$y_{n+1} = y_n + \frac{1}{6} (k_1 + 2k_2 + 2k_3 + k_4)$	$O(h^4)$

## Notes:

1. In each method, the weights (the coefficients that multiply function  $f$ ) add to 1.
2. The order of accuracy (the exponent on  $h$ ) equals the number of  $f$  evaluations per step.