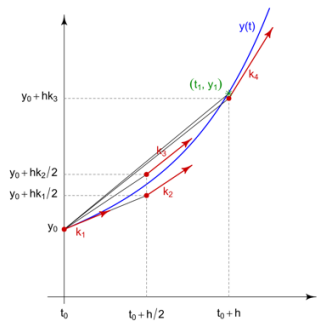


|                         | Forward Euler               | Backward Euler              | Crank-Nicolson              | Runge-Kutta 4 (explicit)   |
|-------------------------|-----------------------------|-----------------------------|-----------------------------|--|
| Rule / Formula (scalar) |                             |                             |                             | $y^{n+1} = y^n + \frac{1}{6} (\Delta y_1 + 2\Delta y_2 + 2\Delta y_3 + \Delta y_4),$ $\Delta y_1 = \Delta t f(y^n, t^n),$ $\Delta y_2 = \Delta t f\left(y^n + \frac{\Delta y_1}{2}, t^n + \frac{\Delta t}{2}\right),$ $\Delta y_3 = \Delta t f\left(y^n + \frac{\Delta y_2}{2}, t^n + \frac{\Delta t}{2}\right),$ $\Delta y_4 = \Delta t f(y^n + \Delta y_3, t^n + \Delta t).$ |
| Sketch                  |                             |                             |                             |  <p>Figure: <a href="https://en.wikipedia.org/wiki/Runge%E2%80%99s_Kutta_methods">https://en.wikipedia.org/wiki/Runge%E2%80%99s_Kutta_methods</a></p>   |
| Error                   |                             |                             |                             |  |
|                         | Implicit / Explicit         | Implicit / Explicit         | Implicit / Explicit         | Implicit / Explicit  |
| Stability               | Conditional / Unconditional | Conditional / Unconditional | Conditional / Unconditional | Conditional / Unconditional  |
| Oscillates?             | Yes / No                    | Yes / No                    | Yes / No                    | Yes / No   |

Explicit:

Implicit:

Conditionally Stable:

Unconditionally Stable: