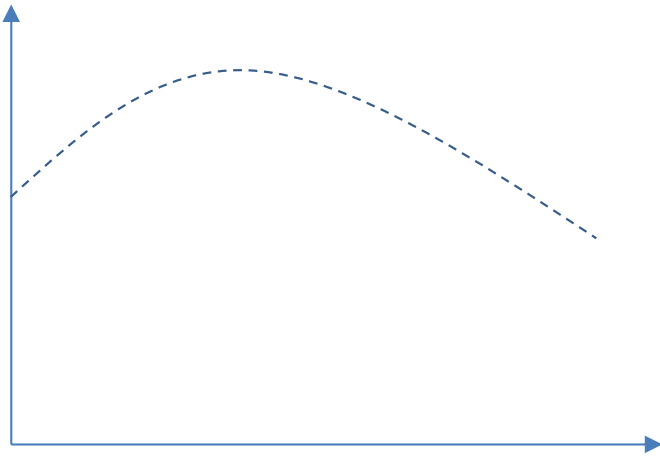


Modified Euler and Runge Kutta Methods

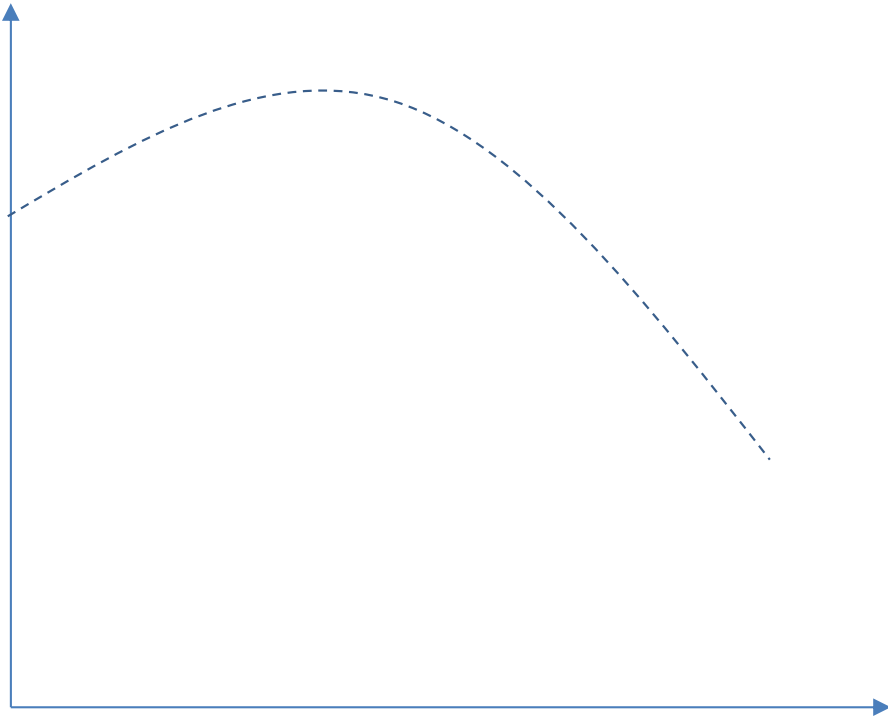
Euler methods for numerical solution of ODEs



1. Explicit

2. Implicit

3. Heun's method

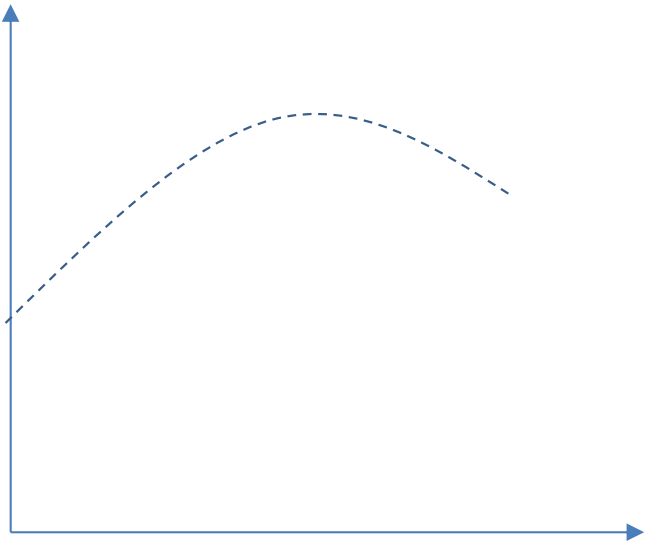


EXAMPLE $\frac{dy}{dx} = \frac{x^3 + 1}{y}$ $y(0) = 2$ $0 \leq x \leq 10, \Delta x = 0.5$

x	y_{exact}	y_{Heun}	$y_{Imp.Euler}$
0	2	2	2
1	2.55	2.575	2.63
2	4.00	4.073	4.33
3	7.106	7.20	6.97
4	11.83	11.929	12.02

4. Midpoint method (modified Euler)

5. Runge Kutta method



Based on Taylor series expansion

Second order

Fourth order