

Euler method for solving differential equations

Example

Differential equation $\frac{dy}{dx} = \frac{x}{1+y^2}$

Initial condition $(x, y) = (1, 2)$

Final value of independent variable $x_f = 3.0$

Step size $\Delta x = 0.5$

x	y	$\frac{dy}{dx} = \frac{x}{1+y^2}$	$\Delta y \cong \frac{dy}{dx} \Delta x$
1.0	2.0000	$\frac{(1.0)}{1+(2.0000)^2} = 0.2000$	$(0.2000)(0.5) = 0.1000$
1.5	2.1000	$\frac{(1.5)}{1+(2.1000)^2} = 0.2773$	$(0.2773)(0.5) = 0.1386$
2.0	2.2386	$\frac{(2.0)}{1+(2.2386)^2} = 0.3327$	$(0.3327)(0.5) = 0.1664$
2.5	2.4050	$\frac{(2.5)}{1+(2.4050)^2} = 0.3685$	$(0.3685)(0.5) = 0.1842$
3.0	2.5892		

