

Example for Euler's method:

general formula: $y' = F(x, y)$, step size h
 initial value: $y(x_0) = y_0$
 $x_n = x_{n-1} + h \rightarrow \left(\begin{array}{c} \overbrace{\quad}^h \quad \overbrace{\quad}^h \quad \dots \quad \overbrace{\quad}^h \\ | \quad | \quad | \quad \dots \quad | \quad | \\ x_0 \quad x_1 \quad x_2 \quad \dots \quad x_{n-1} \quad x_n \end{array} \right)$
 $y_n = y_{n-1} + h \cdot F(x_{n-1}, y_{n-1})$

$y' = 3x + 2y$, $y(0) = 1$, $h = 0.25$
 $\left(\begin{array}{c} \uparrow \\ x_0 \end{array} \right)$ $\left(\begin{array}{c} \uparrow \\ y_0 \end{array} \right)$ \uparrow step size \nwarrow given to you

n	x_n	y_n
0	0	1
1	0.25	1.5
2	0.5	2.4375

need this given: want to approximate $y(0.5)$
 $x_1 = x_0 + h = 0 + 0.25 = 0.25$
 $y_1 = y_0 + h \cdot F(x_0, y_0)$
 $= 1 + 0.25(3 \cdot 0 + 2 \cdot 1) = \underline{1.5}$
 $y_2 = y_1 + h \cdot F(x_1, y_1)$
 $= 1.5 + 0.25 \cdot (3 \cdot 0.25 + 2 \cdot 1.5)$
 $= \underline{2.4375}$
 approximation for $y(0.5) \rightarrow$

