

# WKst 7.2 Euler's Method

1)  $\frac{dy}{dx} = x+2$      $y(0) = 3$      $y(1) = ?$      $\Delta x = .5$      $\begin{matrix} 2 \text{ steps} \\ \Delta x = .5 \end{matrix}$

x	y	dy/dx
0	3	2
.5	4	2.5
1	5.25	

$$y_{\text{new}} = 2(.5) + 3$$

$$y_{\text{new}} = 2.5(.5) + 4$$

a) 5.25

c)  $5.5 - 5.25 = .25$   
Error = .25

b)  $\int dy = \int (x+2) dx$

$$y = \frac{x^2}{2} + 2x + C$$

$$3 = 0 + 0 + C$$

$$C = 3$$

$$y = \frac{x^2}{2} + 2x + 3$$

$$y(1) = \frac{1}{2} + 2 + 3 = 5.5$$

smaller error  $\rightarrow$   
use smaller steps

2)

x	y	dy/dx
2	5	.4
2.5	5.2	.6
3	5.5	.8

$$y = .4(.5) + 5$$

$$y = .6(.5) + 5.2$$

3)  $\frac{dy}{dx} = \frac{1}{x+2}$

$$y(0) = 1$$

$$y(1)$$

$$\Delta x = 0.5$$

x	y	dy/dx
0	1	$\frac{1}{2}$
.5	1.25	$\frac{2}{5}$
1	1.45	

$$y = \frac{1}{2}(.5) + 1$$

$$y = \frac{2}{5}(.5) + 1.25$$

4)  $\frac{dy}{dx} = x + y$   
 $y(1) = 3$   
 $y(2) =$

x	y	dy/dx
1	3	4
1.5	5	6.5
2	8.25	

$y = 4(.5) + 3$   
 $y = 6.5(.5) + 5$

5)  $\frac{dy}{dx} = 4x + y$   
 $y(2) = 0$   
 $y(3) =$

x	y	dy/dx
2	0	8
2.5	4	14
3	11	

$y = 8(.5) + 0$   
 $y = 14(.5) + 4$

6)

x	y	dy/dx
4	2	-0.5
4.2	1.9	-0.3
4.4	1.84	-0.1

$y = -0.5(.2) + 2$   
 $y = -0.3(.2) + 1.9$

7)

x	y	dy/dx
-2	3	-0.8
-1.5	1.8	0.4
1	2.4	

$y = -0.8(1.5) + 3$   
 $y = 0.4(1.5) + 1.8$

8)  $\frac{dy}{dx} = x + 2y$   
 $f(0) = 1$   
 $f(-0.6) =$

x	y	dy/dx
0	1	2
-0.3	.4	.5
-0.6	.25	

$y = 2(-.3) + 1$   
 $y = .5(-.3) + .4$