November 13

How can you find the slope of a function at a point?

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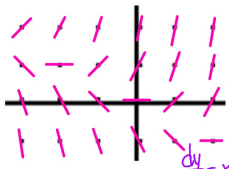
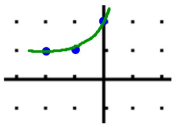
Students will verbally explain how to use Euler's method to approximate the value of a function

(using the words: x-value, y-value, slope ...)

$\frac{dy}{dx} = x + 2y$

Draw the slope field





$\frac{dy}{dx} = x+2y$

$dy = (x+2y)\,dx$

If y = 1 when x = -2, use Euler's Method with dx = 1 to approximate y when x = 0.

Old x	Old y	$\Delta x = dx$	$\Delta y \approx dy = f'(x,y) \times dx$	New x = Old $x + \Delta x$	New y = Old $y + \Delta y$
-2	1	1	(-2+2(1))(1) = 0	-2+1 = -1	1+0 = 1
-1	1	1	(-1+2(1))(1) = 1	-1+1 = 0	1+1 = 2

If y' = x + 3y, with y(0)=1 use Euler's Method with dx = 0.1 to approximate y(0.3).

If y' = 3y - x, with y(1)=3. Use Euler's Method with 2 steps to approximate y(2).

Old x	Old y	$\Delta x = dx$	$\Delta y \approx dy = f'(x,y) \times dx$ $(3y-x)\,dx$	New x = Old $x + \Delta x$	New y = Old $y + \Delta y$
1	3	$\frac{1}{2}$	$(3(3)-1)\frac{1}{2} = 4$	$\frac{3}{2}$	7
$\frac{3}{2}$	7	$\frac{1}{2}$	$(3(7)-\frac{3}{2})\frac{1}{2} = 9\frac{3}{4}$	2	16.75

find $dx = \frac{\text{end } x - \text{start } x}{\#\text{ of steps}}$

$= \frac{2-1}{2} = \frac{1}{2}$

$y(2) \approx 16.75$

If $y' = 2x/y$,
with $y(0)=1$
use Euler's Method
with $dx = 0.1$
to approximate
$y(0.3)$.

$y(0.3) \approx 1.0592$

$$\dot{y} = \frac{dy}{dx} = y'$$