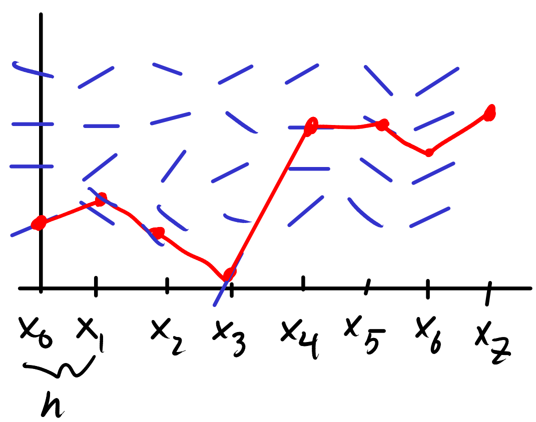
Euler iteration: x_0 y_0 come from initial condition

$$x_1 = x_0 + h \qquad y_1 = y_0 + h \cdot f(x_0, y_0)$$
$$x_2 = x_1 + h \qquad y_2 = y_1 + h \cdot f(x_1, y_1)$$
$$x_3 = x_2 + h \qquad y_3 = y_2 + h \cdot f(x_2, y_2)$$
$$\vdots$$
$$x_{n+1} = x_n + h \qquad y_{n+1} = y_n + h \cdot f(x_n, y_n)$$

Compute enough steps to reach any desired x-value.

h is a parameter in the method, called the <u>step size</u>.

Graphically: Go where the slope field tells you.



This method is computationally intensive, especially with small step size

<u>Example</u>: Use Euler's method to approximate $y(10)$, where $y(x)$ is the solution of $\left\{ \frac{dy}{dx} = x + y, \quad y(0) = 1 \right\}$

What step size? How about $h = 1$

n	0	1	2	3	4	5	6	7	8	9	10
x_n	0	1	2	3	4	5	6	7	8	9	10
y_n	1	2	5	12	27	58	121	248	503	1014	$\boxed{2037}$
$h \cdot f(x_n, y_n) = x_n + y_n$	1	3	7	15	31	63	127	255	511	1023	

$y(10) \approx 2037$