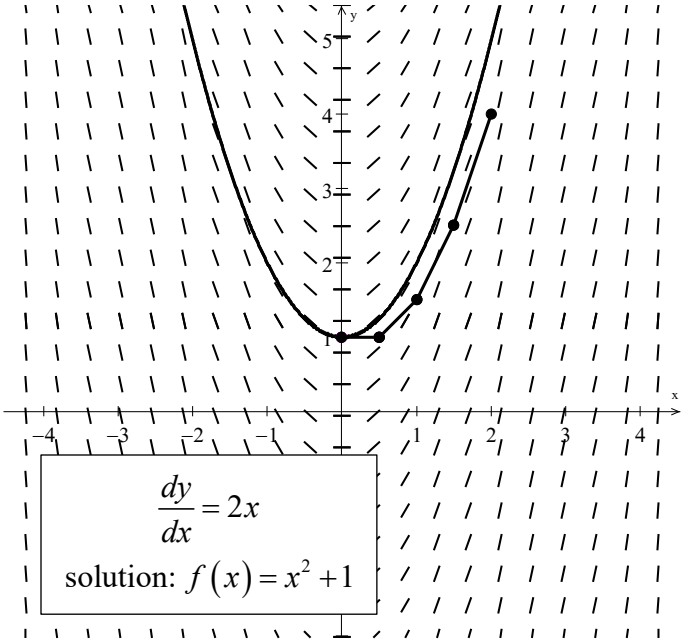

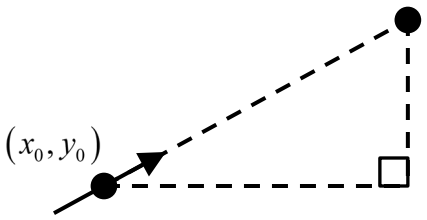

Euler's Method is a process of estimating what the general shape of a solution to a given differential equation looks like.

When sketching the solution to a given differential equation in its slope field, you

1) Choose a starting point

2) Go in the direction that the slope field indicates at the starting point for a short distance, ending up at a new location.

3) At this new location, go in the direction that the slope field indicates for a short distance, ending up at a new location

4) Repeat this iterative process.

Euler's Method *is a numerical method* that describes what you do by hand sketching a solution passing through the starting point in the slope field. In order to start Euler's Method, you need three things

I. A **starting coordinate** (x_0, y_0)

II. The **equation of the differential equation** $\frac{dy}{dx} = \cdots$

III. A **step size** – how far in the *x*-direction you will move each time between points.

No calculator: Let $y = f(x)$ be the solution to the differential equation $\frac{dy}{dx} = x + y$ with the initial condition $f(1) = 2$. What is the approximation for $f(2)$ if Euler's method is used, starting at $x = 1$ with a step size of 0.5?

(a) 3 (b) 5 (c) 6 (d) 10 (e) 12

Use Euler's Method with step size 0.1 to estimate $y(0.2)$, where $y(x)$ is the solution of the initial value problem $\frac{dy}{dx} = y + xy$ where $y(0) = 1$.

Use Euler's Method with step size 0.2 to estimate $y(0.4)$ where $y(x)$ is the solution of the initial-value problem $\frac{dy}{dx} = xy - x^2$ where $y(0) = 1$.