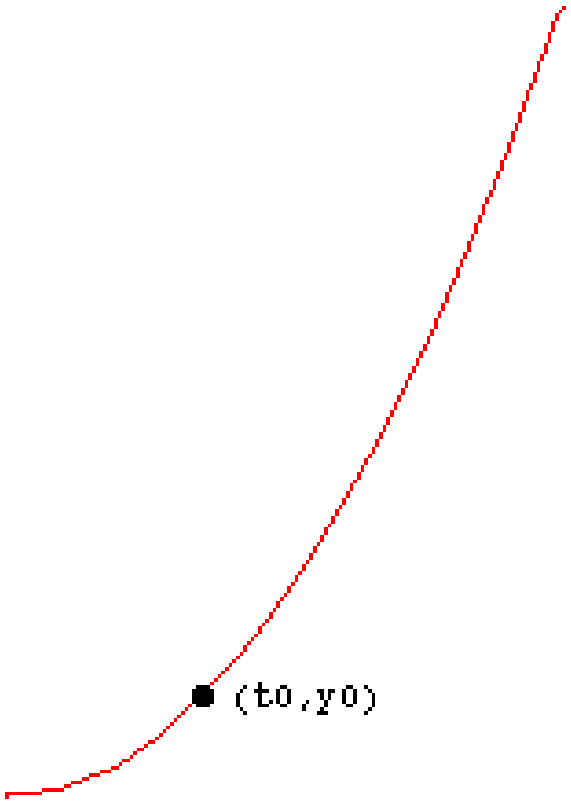
What is a Differential Equation?

An equation in the form:

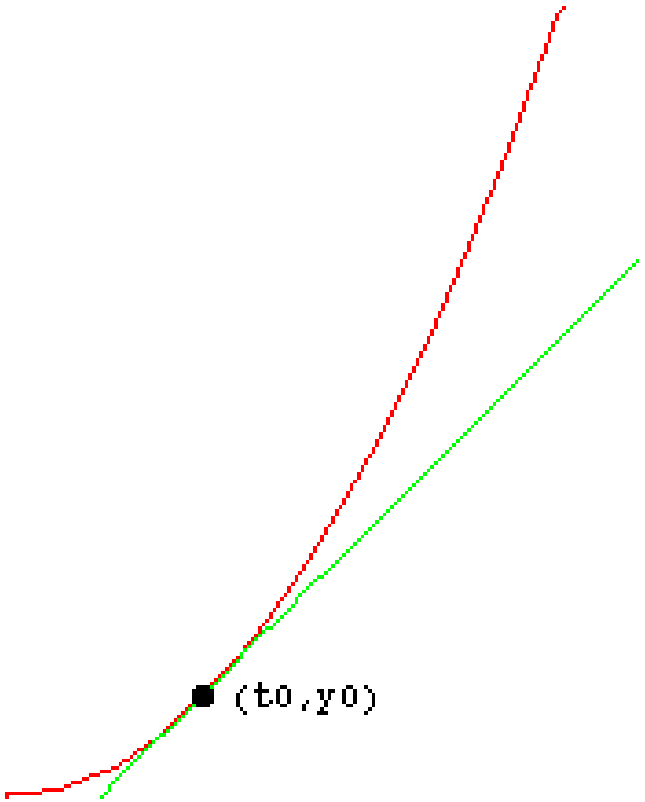
$$y' = \frac{dy}{dt} = f(t,y)$$

Euler's Method



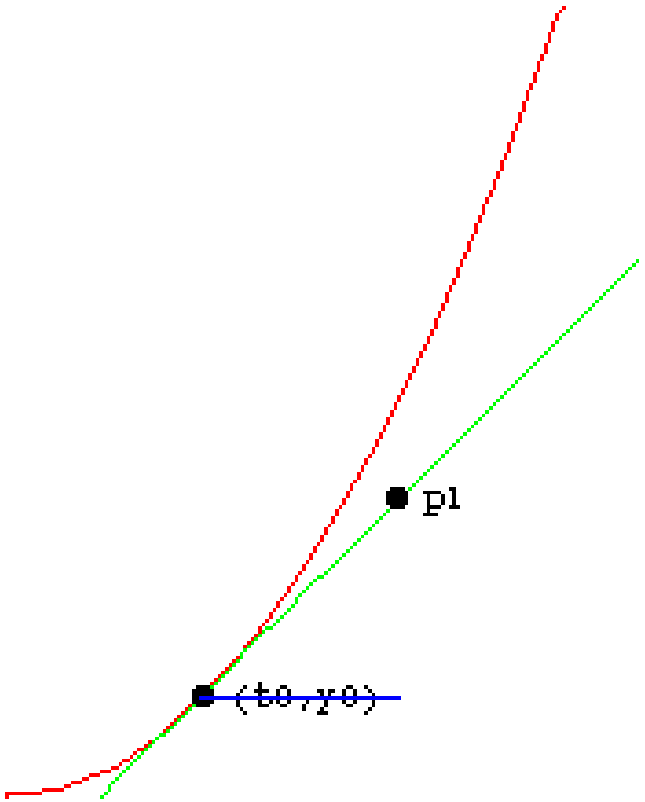
- DE: $y' = f(t,y)$
- We know some initial point, (t_0,y_0), on the desired curve.

Euler's Method



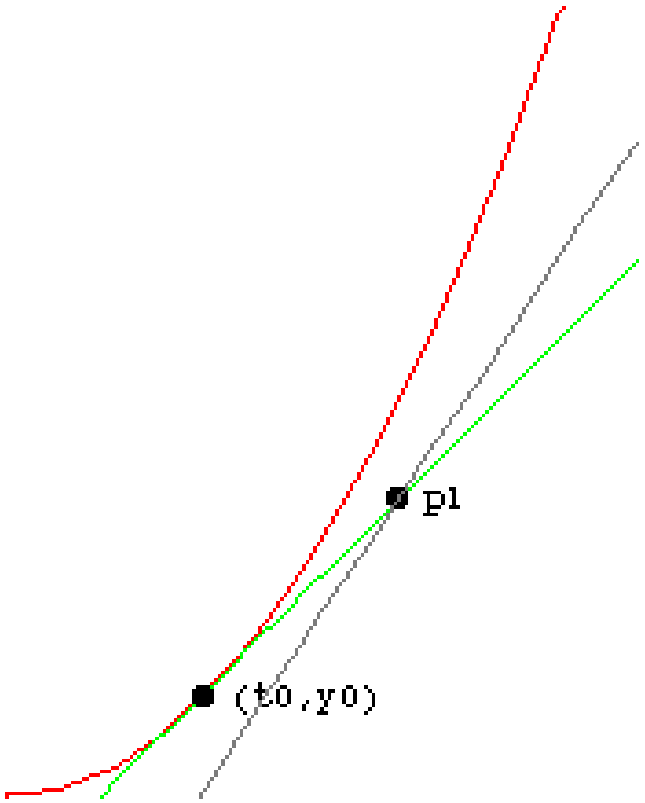
- DE: $y' = f(t,y)$
- We know some initial point, (t_0,y_0), on the desired curve.
- Use the DE to draw a tangent.

Euler's Method



- DE: $y' = f(t,y)$
- We know some initial point, (t_0,y_0), on the desired curve.
- Use the DE to draw a tangent.
- Walk out by Δt to p1.

Euler's Method



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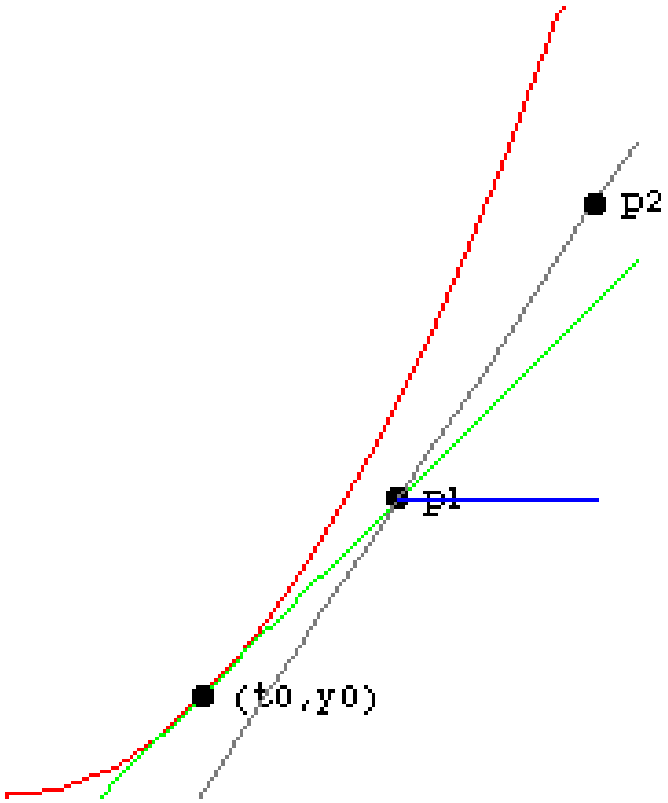
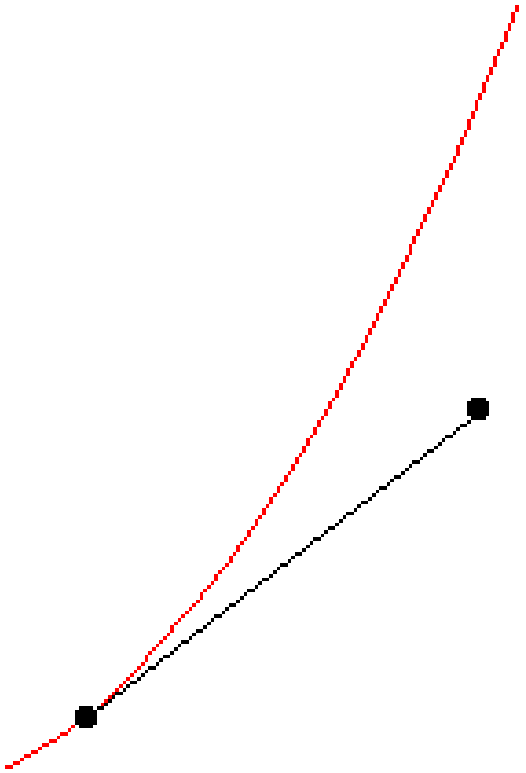
- We know some initial point, (t_0,y_0), on the desired curve.
- Use the DE to draw a tangent.
- Walk out by Δt to p1.
- Use DE to draw tangent.

Euler's Method



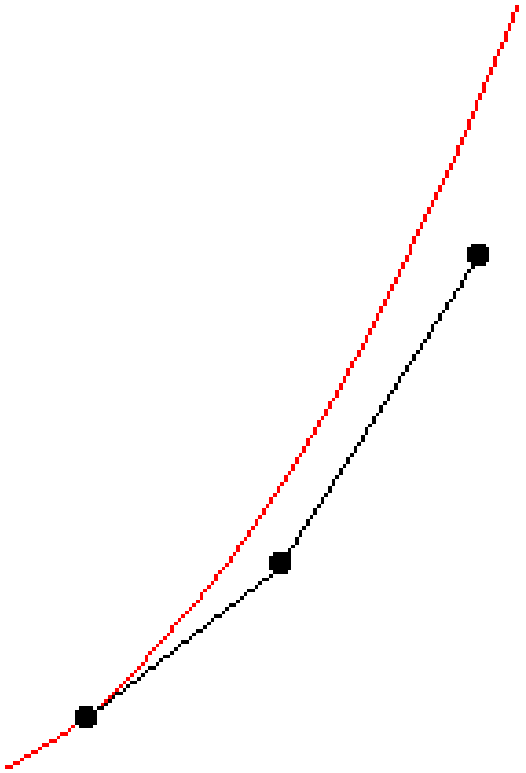
- DE: $y' = f(t,y)$
- We know some initial point, (t_0,y_0), on the desired curve.
- Use the DE to draw a tangent.
- Walk out by Δt to p1.
- Use DE to draw tangent.
- Walk out by Δt to p2.

Euler's Method
Changing Dt



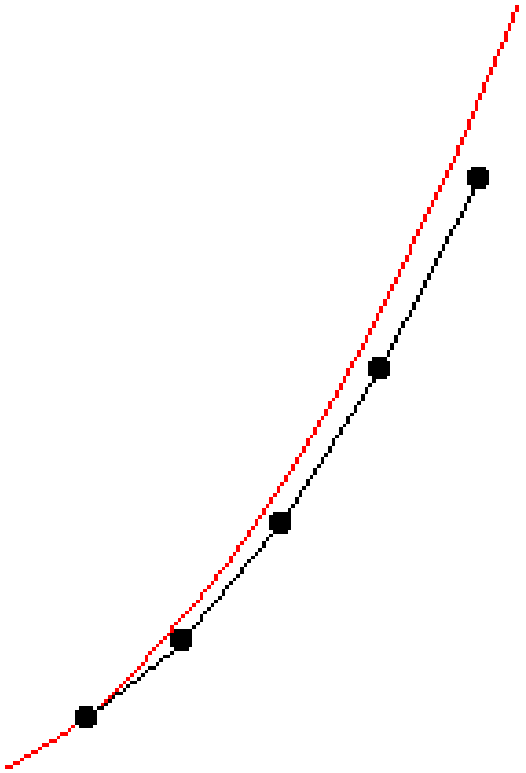
- Let's see what happens as we decrease Δt.
- Let the number of steps, n=1.

Euler's Method
Changing Dt



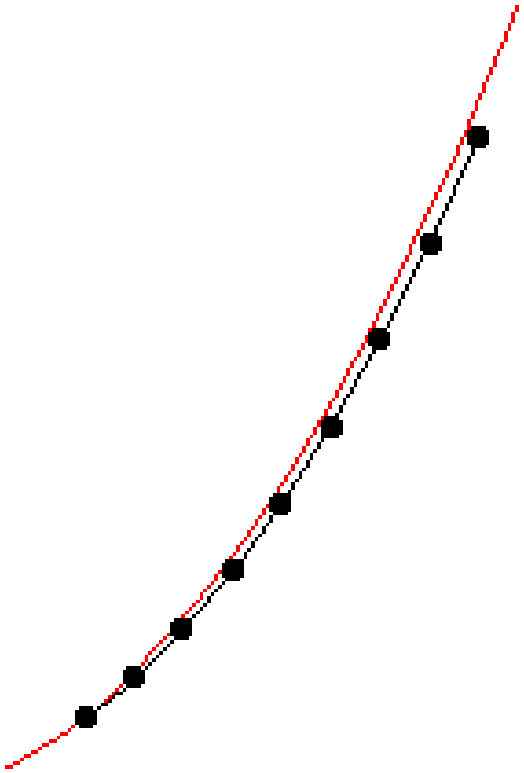
- Let's see what happens as we decrease Δt.
- Let the number of steps, n=2.

Euler's Method
Changing Dt



- Let's see what happens as we decrease Δt.
- Let the number of steps, n=4.

Euler's Method
Changing Dt



- Let's see what happens as we decrease Δt.
- Let the number of steps, n=8.