Derivative of a parametric curve

Given a parametric curve where our function is defined by two equations, one for x and one for y, and both of them in terms of a parameter t,

$$x = f(t)$$

$$y = g(t)$$

we calculate the derivative of the parametric curve using the formula

$$\frac{dy}{dx} = \frac{\frac{dy}{dt}}{\frac{dx}{dt}}$$

where dy/dx is the first derivative of the parametric curve, dx/dt is the derivative of $x = f(t)$ and dy/dt is the derivative of $y = g(t)$.

Example

Find the derivative of the parametric curve.

$$x = 3t^4 - 6$$

$$y = 2e^{4t}$$

We'll start by finding dy/dt and dx/dt.

$$y = 2e^{4t}$$

$$\frac{dy}{dt} = 8e^{4t}$$

and

$$x = 3t^4 - 6$$

$$\frac{dx}{dt} = 12t^3$$

Plugging these into the derivative formula for dy/dx, we get

$$\frac{dy}{dx} = \frac{8e^{4t}}{12t^3}$$

$$\frac{dy}{dx} = \frac{2e^{4t}}{3t^3}$$