

Problem Definition

Problem 65. Find an equation of the tangent line to the following function at the given point.

$$f(t) = \frac{36}{(3-t)^2} \quad (0, 4)$$

Solution Step 1:

To start the process we will need the derivative of the function at the given point. The derivative of the function is given by

$$f'(t) = \frac{d}{dt} (36(3-t)^{-2}) = (36)(-2)(3-t)^{-3}(-1) = (72)(3-t)^{-3}$$

where the function was modified slightly to allow use of the chain rule. The value of the derivative at $t = 0$ is given by

$$f'(0) = (72)(3-0)^{-3} = \frac{72}{27} = \frac{8}{3}$$

Solution Step 2:

As usual we will use the point-slope form for the equation of the tangent line. The form is

$$y - y_0 = m(t - t_0)$$

where $m = f'(0) = 8/3$ and $(t_0, y_0) = (0, 4)$. Substituting the slope and the point results in

$$y - 4 = \frac{8}{3}(t - 0)$$

or

$$y = \frac{8}{3}t + 4$$