

1. Find  $\frac{dy}{dx}$  by implicit differentiation if  $xy^2 - x^3 = 5y$ .
2. Find the equation of the tangent line to the curve  $(2 + x + y)^4 = 11 - 5x$  at the point  $(-1, 1)$ .
3. Environmental studies of a city indicate there will be  $P(x) = x^2 - x + 1000$  units of a harmful water pollutant in the local river when the population of the city is  $x$  thousand people. If the population of the city is currently 80,000 (i.e.,  $x = 80$ ) and is increasing at the rate of 2,000 people per year, at what rate is the level of pollutant increasing?