

Problem statement Consider the differential equations

a) $\frac{dy}{dx} = 2x + 3y$ b) $\frac{dy}{dx} = e^{2x+3y}$ c) $\frac{dy}{dx} = x^3y^2$ d) $\frac{dy}{dx} = x^2 + y^3$

Two of these are separable. For each of these two separable equations, solve the initial value problem with the initial condition $y(0) = 1$. In each case your solution should be written as $y = f(x)$ where $f(x)$ is a formula. Choose one of the *non-separable* equations and explain carefully why it is *not* separable.