

1. Solve the differential equation.

(a)  $\frac{dy}{dx} = xy^2$

(b)  $\frac{dy}{dx} = xe^{-y}$

(c)  $(x^2 + 1)y' = xy$  [Hint: rewrite  $y'$  as  $dy/dx$  first.]

(d)  $(y + \sin y)y' = x + x^3$

(e)  $\frac{du}{dt} = 2 + 2u + t + tu$

2. Find the solution of the differential equation that satisfies the given initial condition.

(a)  $\frac{dy}{dx} = \frac{x}{y}$ ,  $y(0) = -3$

(b)  $y' = \frac{\ln(x)}{xy}$ ,  $y(1) = 2$

(c)  $\frac{dP}{dt} = \sqrt{Pt}$ ,  $P(1) = 2$

(d)  $\frac{du}{dt} = \frac{2t + (\sec t)^2}{2u}$ ,  $u(0) = -5$ .

3. Find an equation of the curve that passes through the point  $(0, 1)$  and whose slope at  $(x, y)$  is  $xy$ .