

For the following find the general solution and then find the particular solution using the given initial condition.

1. $\frac{dy}{dx} = 2xy, y(0) = 3$

2. $\frac{dy}{dx} - e^{x-y} = 0, y(0) = 2$

3. $\frac{dy}{dx} = \frac{y}{x}, y(2) = 2$

4. $\frac{dy}{dx} = -2xy^2, y(1) = \frac{1}{2}$

5. $\frac{dy}{dx} = (\cos x)e^{y+\sin x}, y(0) = 0$

6. $\frac{dy}{dx} = \frac{4\sqrt{y}\ln x}{x}, y(e) = 1$

7. $(x^2 + 1)y' = xy, y(0) = 1$

8. $xy' + y = y^2, y(1) = -1$

9. $\frac{dy}{dx} = ky^2 \ln x, y(1) = -1$

10. $y' \tan x = a + y, y(\pi/3) = a$

11. Solve $y' = x + y$ by making the change of variable $u = x + y$.

12. Solve $xy' = y + xe^{y/x}$ by making the change of variable $u = y/x$.