

Separable Differential Equations (CALC.DEQ.04)

Find the general solution for each separable differential equation.

1. $\frac{dy}{dx} = \frac{12x^3}{4y - \sin y}$

2. $y' = \frac{1}{12}x^2y$

3. $\frac{dy}{dx} = 3x\sqrt{y}$

4. $(e^y + 1)y' = 2 - \sec^2 x$

5. $y' = xe^y$

6. $x + 2y\sqrt{x^2 - 4} \cdot y' = 0$

7. $xy' = 3(y - 2)$

8. $\frac{dy}{dx} = xe^{x^2 - \ln y^2}$

9. $\frac{dy}{dx} = e^{x - 2y}$

10. $\frac{2 \ln x}{x} = y \cdot y' \sqrt{y^2 + 9}$

Find the particular solution that satisfies the initial condition.

11. $y \cdot y' - 5e^x = 10$ $y(0) = 2$

12. $2y \cdot y' = 4 \sin x$ $y\left(\frac{\pi}{4}\right) = \sqrt{2}$

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

14. $\sqrt{x} - \sqrt{y} \cdot y' = 0$ $y(9) = 1$

15. $y(2x - 1) + y' = 0$ $y(-3) = e$

16. $y' = -2 \tan y$ $y(\ln 2) = \frac{\pi}{2}$

17. $y \cdot \ln x - xy' = 0$ $y(e^2) = 1$

18. $y\sqrt{4 - x^2} \cdot y' = x\sqrt{4 - y^2}$ $y(0) = 1$

19. $y' = xy \sin x^2$ $y(0) = \sqrt{e}$

20. $y' = e^{y-x}(x - 1)$ $y(0) = 1$