

Exercise. 1 Solve the following differential equations.

a) $(1 + e^x)y' = -e^xy$ $y(0) = 2$

answer: $y = \frac{4}{1 + e^x}$

b) $y' \cdot y \cdot x = \sqrt{y^2 + 1}$ $y(e) = 0$

answer: $\sqrt{y^2 + 1} = \ln |x|$

c) $(xy' - y) \ln \frac{y}{x} = x$ $y(1) = e$

answer: $y(\ln \frac{y}{x} - 1) = x \ln |x|$

d) $y' + \frac{y}{x} = \frac{\sin x}{x}$

answer: $y = -\frac{\cos x + C}{x}$

e) $y' - \frac{y}{x} = x^2$ $y(1) = 0$

answer: $y = \frac{x^3 - x}{2}$

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