Differential Equations

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1 Daily Quiz

Find the general solution of the differential equation

$$y^2y' + t = 0.$$

2 Key Topics

Today we review the methods of integration factor and separation of variables. For further reading, see [1, Sections 1.2 and 1.5] and [2, Sections 2.1–2.2].

3 Exercises

Solve each differential equation below using the correct method, or state why it can't be solved using the method of integration factor or separation of variables.

a. $y' = 2t - 3y + e^{-t}$

b. $(t^2 + 1)y' = ty$

c. $y' + \frac{1}{t}y = \ln(t)$

d. $y' = \frac{\sec^2(t) + 2t}{2y}$

e. $y' = y^2 + t^2$

f. $y' = t(1 + y^2)$

g. $y' + 2ty = t$

h. $y' = \frac{1}{t}y + \frac{1}{\sqrt{t^2 - 1}}$

i. $y'' + y = \cos(t)$

j. $y' = \frac{1}{y\,(t^2 + 5t + 6)}$

References

[1] T. W. Judson, *The Ordinary Differential Equations Project*, Creative Commons Attribution-Noncommercial-Share Alike, 1st ed., 2023.

[2] W. Trench, *Elementary Differential Equations with Boundary Value Problems*, Creative Commons Attribution-Noncommercial-Share Alike, 1st ed., 2013.