

STEP/Differential Equations: Exercises - Overview

(15/6/23)

Q1

Solve $\frac{dy}{dx} = x + y$ by:

- (a) finding an integrating factor
- (b) making the substitution $z = x + y$

Q2

To convert $x^2 \frac{d^2y}{dx^2} + ax \frac{dy}{dx} + by = 0$

to $\frac{d^2y}{du^2} + c \frac{dy}{du} + dy = 0$ (*)

Which of the following substitutions works: $u = e^x$ or $x = e^u$?

Q3

Show that $\frac{dy}{dx} = f\left(\frac{y}{x}\right)$ can potentially be solved by making a substitution.

Q4

Solve $\frac{dy}{dx} = \frac{x^3 + 4y^3}{3xy^2}$, $x > 0$