NORTH SOUTH UNIVERSITY

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School of Engineering & Physical Sciences
Department of Mathematics & Physics

MAT 350 (Engineering Mathematics) - Section: 06
HW: 02 Semester: Summer 2022
Deadline: 26/06/2022

Questions:

Determine whether the given differential equation is exact. If it is exact, solve it.

1. $(2x + y)\,dx - (x + 6y)\,dy = 0$
2. $(\tan x - \sin x \sin y)\,dx + \cos x \cos y\,dy = 0$
3. $\left(1 - \frac{3}{y} + x\right)\frac{dy}{dx} + y = \frac{3}{x} - 1$
4. $(e^x + y)\,dx + (2 + x + ye^y)\,dy = 0, \quad y(0) = 1$
5. $(x^2 - y^2)\,dx + (x^2 - 2xy)\,dy = 0$

Find the general solution of the given differential equation. Determine whether there are any transient terms in the general solution.

6. $xy' + y = e^x, \quad y(1) = 2$
7. $y' + (\tan x)y = \cos^2 x, \quad y(0) = -1$
8. $x\frac{dy}{dx} - y = x^2 \sin x$

Solve the following Bernoulli's differential equation by using an appropriate substitution.

9. $\frac{dy}{dx} = y(xy^3 - 1)$
10. $y^{1/2}\frac{dy}{dx} + y^{3/2} = 1, \quad y(0) = 4$

Find the general solution of the given second order differential equation:

11. $y'' - 36y = 0$
12. $y'' - 3y' + 2y = 0$

13. $y'' + 4y' - y = 0$

14. $2y'' - 3y' + 4y = 0$

15. $3y'' + y = 0$