International Islamic University Chittagong
Department Of Computer Science and Engineering
Differential Equation
Ordinary Differential Equation
Group- A

Definition

1. Differential Equations

2. Ordinary Differential Equations

3. Partial Differential Equations

4. Order of Differential Equations

5. Degree of Differential Equations

6. Linear Differential Equations

7. Bernoulli's Differential Equations

8. Exact Differential Equations

9. Linear Differential Equations with Constant Coefficient

10. Integrating Factor

11. Bessel's Equation

12. Bessel's Function

Formation of Differential Equation

1. Form the differential equation whose solution is given by

i. $y = A \cos(ax - b)$

ii. $xy = pe^x + qe^{-x}$

iii. $y = A \cos px + B \sin px$

Variables Separable

1. $x(y - 3)dy = 4y\, dx$

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

3. $\frac{dy}{dx} = xy^3(1 + x^2)^{-\frac{1}{2}}, y(0) = 1$

Reducible Separable Variable

1. $\frac{dy}{dx} = (4x + y + 1)^2$

2. $\frac{dy}{dx} = (x + y) + cox(x + y)$

Homogeneous Differential Equation

1. $y^2 + x^2 \frac{dy}{dx} = xy \frac{dy}{dx}$

Prepared by Ali Azgor (2CM)

2. $\frac{dy}{dx} + \frac{y(x+y)}{x^2} = 0$

Special case

1. Solve $(2x - 2y + 5)\frac{dy}{dx} = x - y + 3$

2. Solve $\frac{dy}{dx} = \frac{6x-4y+3}{3x-2y+1}$

Particular case

1. Solve $x\frac{dy}{dx} = \frac{2x-y+1}{x+2y-3}$

2. Solve $\frac{dy}{dx} + \frac{ax+hy+g}{hx+by+7} = 0$

Linear Differential Equation

1. $(1 - x^2)\frac{dy}{dx} - xy = 1$

2. $y \, logy \, dx + (x - logy)dy = 0$

Bernoulli's Differential Equation

1. $\frac{dy}{dx} = x^3y^3 - xy$

2. $x\frac{dy}{dx} + y = x^4y^3$

3. $xy - \frac{dy}{dx} = y^3e^{-x^2}$

Exact Differential Equation

1. $(x - 2e^y)dy + (y + x \, sinx)dx = 0$

2. Solve $(y^4 + 4x^3y + 3x)dx + (x^4 + 4xy^3 + y + 1)dy = 0$

If not exact,

1. $((x^2 + y^2)dx - 2xy \, dy = 0$

2. $(x^4 + 2y)dx + (xy^3 + 2y^4 - 4x)dy = 0$

3. $(2x \, logx - xy)dy + 2y \, dx = 0$

Higher Order Differential Equation with Constants Co-efficients

1. $\frac{d^3y}{dx^3} - 3\frac{d^2y}{dx^2} + 4\frac{dy}{dx} - 2y = e^x + cosx$

2. $\frac{d^3y}{dx^3} + 3\frac{d^2y}{dx^2} + 3\frac{dy}{dx} + y = e^{-x} + 1 + sin2x$

Suggestion from

Rashed sir