Maths(3) Lec(5)
2nd Order ODEs

Omar Sherif EL-Tabarany

29 Oct 2023

1 Solution of higher order ODEs

General Form:

$$a_n \frac{d^n y}{dx^n} + a_{n-1} + ... + a_2 \frac{d^2 y}{dx^2} + a_o y = f(x)$$

2nd Order ODE:

$$a_2 \frac{d^2 y}{dx^2} + a_o y = f(x)$$

General Solution:

$$y_g = y_h + y_p$$

$$ax^2 + bx + c = 0$$

$$x_{1,2} = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

- 1) $b^2 - 4ac > 0$ roots are unequal and real
- 2) $b^2 - 4ac < 0$ roots are equal and real
- 3) $b^2 - 4ac = 0$ roots are complex