Outline of Section 3.2.3.3

1. Linear combination of solutions are also the solutions of linear ODE.

2. The Wronskian determinant is non-zero, then we can conclude that \( y_1, y_2 \) form a fundamental solutions of the linear ODE, the general solution can be given by \( y = c_1 y_1 + c_2 y_2 \)

3. How to solve the second linear homogeneous ODE with constant coefficients

\[ ay'' + by' + cy = 0 \quad (\text{a}) \]

\[ \text{Step 1: characteristic equation} \]
\[ ar^2 + br + c = 0 \]

\[ \text{Step 2:} \; A > 0, \; \text{two real roots} \; r_1, r_2 \]
Then the general solution of (\text{a}) are given by
\[ y = c_1 e^{r_1 t} + c_2 e^{r_2 t} \]

\[ \Delta < 0, \; \text{two conjugate complex roots} \, \lambda \pm i\mu \]
Then the general solution of (\text{a}) are given by
\[ y = c_1 e^{\lambda t} \cos \mu t + c_2 e^{\lambda t} \sin \mu t \]