1. Solve the differential equation or initial value problem using the method of undertermined coefficients.
   (a) \( y'' + 3y' + 2y = x^2 \)
   (b) \( y'' + 9y = e^{3x} \)
   (c) \( y'' - 4y = e^x \cos x, \quad y(0) = 1, \quad y'(0) = 2 \)

2. Find all solutions to the equation \( x^4 = 1 \).

3. Write a trial solution for the method of undertermined coefficients for the differential equation
   \[ y'' + 3y' - 4y = (x^3 + x)e^x \]
   Do not determine the coefficients.

4. Use de Moivre’s Theorem with \( n = 3 \) to express \( \cos 3\theta \) and \( \sin 3\theta \) in terms of \( \cos \theta \) and \( \sin \theta \).

5. Prove the following properties of complex numbers, where a line over a complex number indicates its complex conjugate.
   (a) \( \bar{z} + ar{w} = \bar{z + w} \)
   (b) \( \bar{zw} = \bar{z}\bar{w} \)
   (c) \( \bar{z^n} = \bar{z}^n \)