1. Find the general solution of the differential equation

\[(D - 3)[y] = xe^{2x} + e^{3x}\]

2. Find the general solution of

\[y'' + 4y = \cos^3 x\]

HINT: Write

\[\cos 3x + i \sin 3x = (\cos x + i \sin x)^3\]

by Euler’s formula, expand and find the identities for \(\cos^3 x\) and \(\sin^3 x\).

3. Solve the following IVP:

\[y^{(3)} = y, \ y(0) = 1, \ y'(0) = y''(0) = 0.\]

4. Find the general solution of the following equation:

\[y'' + y' + y = \sin x \sin 3x\]

Hint: use a trigonometric identity

5. In the following problems, find the particular solution.

a) \[y'' + y = \sin x + x \cos x\]

b) \[y^{(4)} - 5y'' + 4y = e^x - xe^{2x}\]