Part I Problems

In each of the following three problems find a particular solution to the differential equation. Use complex exponentials where possible.

**Problem 1:** \( y^{(3)} + y'' - y' + 2y = 2\cos x \)

**Problem 2:** \( y'' - 2y' + 4y = e^x \cos x \)

**Problem 3:** \( y'' - 6y' + 9y = e^{3x} \)

**Problem 4:** Find the real general solution to the DE
\[
\frac{d^3x}{dt^3} - x = e^{2t}
\]

**Problem 5:** Find a particular solution to the differential equation
\[
y'' - 4y = \frac{1}{2} (e^{2x} + e^{-2x})
\]