MAT 2384-Practice Problems on Nonhomogeneous second order ODEs-Methods of Undermined Coefficients and the Variation of Parameters

For each of the following ODEs, Find the General Solution. If an initial condition is given, find also the corresponding particular solution.

1. $y'' + 3y' + 2y = 30e^{2x}$
2. $y'' + y = \csc(x)$
3. $y'' - 16y = 19.2e^{4x} + 60e^{x}$
4. $x^2y'' - 2xy' + 2y = x^3\cos(x)$
5. $y'' + 4y = 16\cos(2x),\ \ y(0) = 0,\ \ y'(0) = 0$
6. $y'' + y' - 6y = 6x^3 - 3x^2 + 12x$
7. $y'' - 4y' + 4y = \frac{12e^{2x}}{x^4}$
8. $y'' + y = \tan(x)$
9. $x^2y'' - xy' + y = x\ln(|x|)$
10. $y'' + 6y' + 73y = 80e^{x}\cos(4x)$
11. $y'' - y' - 12y = 144x^3 + 12.5,\ \ y(0) = 5,\ \ y'(0) = -0.5$
12. $y'' + y = \cos(x) + \sec(x)$
13. $x^2y'' + xy' - \frac{1}{4}y = \frac{3}{x} + 3x$
14. $y'' - 0.16y = 32\cosh(0.4x)$
15. $y'' - 2y' + y = x^2 + x^{-2}e^{x}$
16. $y'' + 1.44y = 24\cos(1.2x)$
17. $y'' + 9y = 18x + 36\sin(3x)$
18. $y'' + 4y' + 5y = 25x^2 + 13\sin(2x)$
19. $x^2y'' - 2xy' + 2y = x^3\sin(x)$
20. $y'' + 2y' + y = 2x\sin(x)$
21. $y'' + 2y' + 10y = 17\sin(x) - 37\sin(3x),\ \ y(0) = 6.6,\ \ y'(0) = -2.2$