Differential Equations. Week 7

Solve the following equations:

1. (Filippov 533) $y'' - 2y' - 3y = e^{4x}$
2. (Filippov 544) $y'' - 9y = e^{3x}\cos x$
3. (Filippov 546) $y'' + y = x\sin x$

Show the form of the particular solution to look for (with undetermined coefficients).

4. (Filippov 549) $y'' - 2y' + 2y = e^x + x\cos x$
5. (Filippov 556) $y''' + y' = \sin x + x\cos x$
6. (Filippov 563) $y^{(4)} + y'' = 7x - 3\cos x$

Find a solution of a given initial value problems.

7. (Filippov 583) $y'' + y = 4e^x$, $y(0) = 4$, $y'(0) = -3$.
8. (Filippov 588) $y^{(4)} + y'' = 2\cos x$, $y(0) = -2$, $y'(0) = 1$, $y''(0) = 0$, $y'''(0) = 0$.

Find a solution of a given boundary value problems.

9. (Filippov 751) $y'' - y = 2x$, $y(0) = 0$, $y(1) = -1$
10. (Filippov 755) $y'' + y = 1$, $y(0) = 0$, $y(\pi) = 0$.
11. (Filippov 758) $y'' - y = 1$, $y(0) = 0$, $y|_{x\to\infty}$ is bounded.

Construct the Green's function for a given boundary value problems.

12. (Filippov 764) $y'' = f(x)$, $y(0) = 0$, $y(1) = 0$.
13. (Filippov 767) $y'' - y = f(x)$, $y'(0) = 0$, $y'(2) + y(2) = 0$.
14. (Filippov 772) $y'' = f(x)$, $y(0) = 0$, $y|_{x\to\infty}$ is bounded.

Find eigenvalues and eigenfunctions.

15. (Filippov 782) $y'' = \lambda y$, $y(0) = 0$, $y(l) = 0$.
16. (Filippov 783) $y'' = \lambda y$, $y'(0) = 0$, $y'(l) = 0$.
17. (Filippov 784) $y'' = \lambda y$, $y(0) = 0$, $y'(l) = 0$.

Homework: Filippov 537, 571, 780.