I. Find the inverse Laplace transform (using residues or convolution):

1. $F(s) = \frac{1}{s^3(s^2+1)}$,
2. $F(s) = \frac{s}{(s^2+9)^2}$,
3. $F(s) = \frac{1}{s^2(s+2)}$,
4. $F(s) = \frac{1}{s^3(s-3)}$.

II. Use the Laplace transform to solve:

1. $y'' + 9y = x$, $y(0) = 2$, $y'(0) = 0$,
2. $y'' + 4y = 2e^{-x}$, $y(0) = 0$, $y'(0) = 0$,
3. $y'' + 2y' + y = e^{x}$, $y(0) = 0$, $y'(0) = -2$,
4. $y'' - 5y' + 6y = 2e^{x}$, $y(0) = 1$, $y'(0) = 1$,
5. $y'' + 4y = 2x$, $y(0) = 0$, $y'(0) = 1$,
6. $y'' + 4y = \cos 2x$, $y(0) = 0$, $y'(0) = 4$,
7. $y'' + 4y = x + \sin 2x$, $y(0) = 0$, $y'(0) = 0$,
8. $y'' + 4y = 1 + \sin 2x$, $y(0) = \frac{1}{4}$, $y'(0) = 0$,
9. $y'' + y = \cos x$, $y(0) = 0$, $y'(0) = 0$,
10. $y'' + y = \sin x$,
11. $y'' + 2y' + y = e^{-x}$,

12. $\begin{cases} y' = z \\ z' = y + e^{x} + e^{-x} \end{cases}$, $y(0) = 0$, $z(0) = 0$,

13. $\begin{cases} y' = z + \cos x \\ z' = -y + 1 \end{cases}$, $y(0) = 1$, $z(0) = 1$,

14. $\begin{cases} y' + z = 1 \\ z' - y = -1 \end{cases}$, $y(0) = 2$, $z(0) = 1$,

15. $\begin{cases} y' = -2y - 4z + 1 + 4x \\ z' = -y + z + \frac{3}{2}x^2 \end{cases}$, $y(0) = 0$, $z(0) = 0$,

16. $\begin{cases} y' + 3y + z = 0 \\ z' - y + z = 0 \end{cases}$, $y(0) = 1$, $z(0) = 1$,

17. $\begin{cases} y' - 2y - 4z = \cos x \\ z' + y + 2z = \sin x \end{cases}$, $\qquad y(0) = 0, \qquad z(0) = 0,$

18. $\begin{cases} y' = y + z - \cos x \\ z' = -2y - z + \sin x + \cos x \end{cases}$, $\qquad y(0) = 1, \qquad z(0) = 2.$