1) An LTIC system is specified by the equation $(D^2 + 6D + 8)y(t) = (D+2)x(t)$

    a) Find the characteristic polynomial, characteristic equation, characteristic roots, and characteristic modes of this system.

    b) Find $y_0(t)$ the zero-input component of the response $y(t)$ for $t \geq 0$, if the initial conditions are $y_0(0^-) = 2$ and $\dot{y}_0(0^-) = -1$.

2) Repeat Problem 1 for $(D^2 + 6D + 9)y(t) = Dx(t)$ and $y_0(0^-) = 0$ and $\dot{y}_0(0^-) = -1$.

3) Repeat Problem 1 for $(D^2 + 4D + 8)y(t) = Dx(t)$ and $y_0(0^-) = 1$ and $\dot{y}_0(0^-) = -2$.

4) Find the unit impulse response $h(t)$ of a system specified by the equation $(D^2 + 5D + 6)\, y(t) = (D+2)\, x(t)$

5) Find the unit impulse response of a system specified by the equation $(D^2 + 4D + 3)\, y(t) = (D^2 + 2)\, x(t)$