Assignment #10 Adrian Oanian

1) $F(s) = \frac{1}{s} + \frac{2}{s+1} = L^{-1}\{\frac{1}{s}\} + L^{-1}\{\frac{2}{s+1}\} = H(t) + 2e^{-t}$

2) $F(s) = \frac{e^{-4s}}{s+2} = H(t-4)L^{-1}\{\frac{1}{s+2}\}(t-4) = H(t-4)e^{-2(t-4)}$

3) $F(s) = \frac{3s+1}{s+4} = 3 - \frac{11}{s+4} = L^{-1}\{3\} - L^{-1}\{\frac{11}{s+4}\} = 3\delta(t) - 11e^{-4t}$

4) $F(s) = \frac{4}{(s+1)(s+2)} = L^{-1}\{\frac{4}{s+1}\} - L^{-1}\{\frac{4}{s+2}\} = 4e^{-t} - 4e^{-2t}$

5) $F(s) = \frac{6s}{(s+1)(s+2)} = -L^{-1}\{\frac{6}{s+1}\} + L^{-1}\{\frac{12}{s+2}\} = -6e^{-t} + 12e^{-2t}$

6) $F(s) = \frac{s^2+2}{s^3+2s^2+2s} = L^{-1}\{\frac{1}{s}\} - 2L^{-1}\{\frac{1}{(s+1)^2+1}\} = H(t) - 2e^{-t}\sin(t)$

7) $F(s) = \frac{10}{(s+1)(s^2+4s+8)} = L^{-1}\{\frac{2}{s+1}\} - 2L^{-1}\{\frac{s+2}{(s+2)^2+4}\} - 2L^{-1}\{\frac{1}{(s+2)^2+4}\} = 2e^{-t} - 2e^{-2t}\cos(2t) - e^{-2t}\sin(2t)$

8) $F(s) = \frac{2}{s(s+1)^2} = L^{-1}\{\frac{2}{s}\} - L^{-1}\{\frac{2}{s+1}\} - L^{-1}\{\frac{2}{(s+1)^2}\} = 2H(t) - 2e^{-t} - e^{-t}(2t)$

9) $F(s) = \frac{8}{s(s+1)^3} = L^{-1}\{\frac{8}{s}\} - L^{-1}\{\frac{8}{s+1}\} - L^{-1}\{\frac{8}{(s+1)^2}\} - L^{-1}\{\frac{8}{(s+1)^3}\} = 8H(t) - 8e^{-t} - e^{-t}(8t - e^{-t})(4t^2)$

10) $\frac{d^2v(t)}{dt^2} + 5\frac{dv(t)}{dt} + 6v(t) = 25e^{-t}u(t)$ $\quad v(0^-) = 5 \quad v'(0^-) = 10 \quad v''(0^-) = 0$

$$\frac{d^2v(t)}{dt^2} + 5\frac{dv(t)}{dt} + 6v(t) = 0 + 5(10) + 6(5) = 80 = 25e^{-0}u(0^-)$$

$$\frac{80}{25} = u(0^-) = \frac{16}{5}$$