Math 331.2: Homework 11 (Section 6.3, 6.4, 6.5)

For the following function find the inverse Laplace transform.

1. $\dfrac{5e^{-4s}}{s^2+4}$

2. $\dfrac{1-e^{-s}-e^{-2s}-e^{-3s}-e^{-4s}}{s}$

3. $\dfrac{2e^{-4s}s}{s^2+4s+9}$

4. $\dfrac{1-3e^{-4s}}{s^2-6s+18}$

For the following problems, using Laplace transform, *solve the initial value problem* and *make a graph of the solutions.*

5. $y'+3y = h(t)\,,\ y(0)=-1$, where $h(t) = \begin{cases} 2 & 0\le t<4 \\ 5 & t\ge 4 \end{cases}$

6. $y'-5y = 2\delta(t-2)-2\delta(t-4)\,,\ y(0)=0$

7. $y'+4y = 3u_4(t)\cos(3(t-4))\,,\ y(0)=0$

8. $y''+2y = 2u_5+u_7(t)\,,\ y(0)=0\,,\ y'(0)=-2$

9. $y''+3y'+\dfrac{5}{2}y = 3\delta(t-2)\,,\ y(0)=1\,,\ y'(0)=-3$

10. $y''+7y'+6y = g(t)\,,\ y(0)=0, y'(0)=1$, where $g(t) = \begin{cases} 3 & 0\le t<2 \\ -2 & t\ge 2 \end{cases}$

11. $y''+2y'+3y = \delta(t-4)+2u_3(t)\,, y(0)=0\,,\ y'(0)=0$

12. $y''+y = u_3(t)e^{-2(t-3)}\,,\ y(0)=0\,,\ y'(0)=0$