PRACTICE PROBLEMS CHAPTER 6 AND 7

I. Laplace Transform

1. Find the Laplace transform of the following functions.

(a) $f(t)=\sin(2t)\cos(2t)$

(b) $f(t)=\cos^2(3t)$

(c) $f(t)=t\,e^{2t}\sin(3t)$

(d) $f(t)=(t+3)u_7(t)$

(e) $f(t)=t^2u_3(t)$

(f) $f(t)=\begin{cases}1, & \text{if } 0\le t<2,\\ t^2-4t+4, & \text{if } t\ge 2\end{cases}$

(g) $f(t)=\begin{cases}t, & \text{if } 0\le t<3,\\ 5, & \text{if } t\ge 3\end{cases}$

(h) $f(t)=\begin{cases}0, & \text{if } t<\pi,\\ t-\pi, & \text{if } \pi\le t<2\pi\\ 0, & \text{if } t\ge 2\pi\end{cases}$

(i) $f(t)=\begin{cases}\cos(\pi t), & \text{if } t<4,\\ 0, & \text{if } t\ge 4\end{cases}$

(j) $f(t)=\begin{cases}t, & \text{if } 0\le t<1,\\ e^t, & \text{if } t\ge 1\end{cases}$

2. Find the inverse Laplace Transform:

(a) $F(s)=\dfrac{1}{(s+1)(s^2-1)}$

(b) $F(s)=\dfrac{2s+3}{s^2+4s+13}$

(c) $F(s)=\dfrac{e^{-3s}}{s-2}$

(d) $F(s)=\dfrac{1+e^{-2s}}{s^2+6}$