Binay, Mary Nina V. 20-08835
ME 4205

II. Solve for the following Inverse Laplace

3. $L^{-1}\left[\frac{7}{s^2+6}\right] = f(t)$

$$7L^{-1}\left[\frac{1}{s^2+6}\right] = \frac{7}{\sqrt{6}}L^{-1} = \left[\frac{\sqrt{6}}{s^2+6}\right] = \frac{7}{\sqrt{6}}\sin\sqrt{6}t$$

$a^2 = 6$

$a = \sqrt{6}$

$1 = \sqrt{6}/\sqrt{6}$

$$\boxed{\therefore f(t) = \frac{7\sqrt{6}}{6}\sin\sqrt{6}t}$$

III. Solve for the following Inverse Laplace

1. $F(s) = \frac{1}{s(s^2+2s+2)}$

$$\left[\frac{1}{s(s^2+2s+2)} = \frac{A}{s} + \frac{Bs+C}{s^2+2s+2}\right] s(s^2+2s+2)$$

$$1 = A(s^2+2s+2) + (Bs+C)s$$

if $s=0$

$$1 = A(0^2+2(0)+2) + (B(0)+C)(0)$$

$$\underline{A = 1/2}_{\#}$$

Substitute A to the equation

$$\left[1 = \frac{1}{2}(s^2+2s+2) + (Bs+C)s\right] 2$$

$$2 = s^2+2s+2+2Bs^2+2Cs$$

$$2 = s^2(2B+1) + 2s(C+1) + 2$$

$$2B+1=0 \qquad C+1=0$$

$$B=-1/2 \qquad C=-1$$

Solving Inverse Laplace

$$L^{-1}\left[\frac{A}{s} + \frac{Bs+C}{s^2+2s+2}\right] = f(t)$$

$$L^{-1}\left[\frac{1/2}{s} + \frac{(-1/2)s+(-1)}{s^2+2s+2}\right] = f(t)$$

$$L^{-1}\left[\frac{1/2}{s} - \frac{1/2 s+1}{s^2+2s+2}\right] = f(t)$$

① $\frac{1}{2}L^{-1}\left[\frac{1}{s}\right] = \frac{1}{2}_{\#}$

② $L^{-1}\left[\frac{1/2 s+1}{s^2+2s+2}\right]$; $1 = \frac{2}{2}$

$$L^{-1}\left[\frac{1/2 s + 2(1/2)}{s^2+2s+2}\right]$$

$$\frac{1}{2}L^{-1}\left[\frac{s+2}{s^2+2s+2}\right]$$

$$\frac{1}{2}L^{-1}\left[\frac{(s+1)+1}{(s^2+2s+1)+1}\right]$$

$$\frac{1}{2}L^{-1}\left[\frac{(s+1)+1}{(s+1)^2+1}\right] \quad ; a=1,\ w=1$$

$$\underline{f(t) = \frac{1}{2}\left[e^{-t}(\cos t + \sin t)\right]}_{\#}$$

$$\therefore f(t) = \frac{1}{2} - \frac{1}{2}\left[e^{-t}(\cos t + \sin t)\right]$$

$$\boxed{f(t) = \frac{1}{2}\left[1 - e^{-t}(\cos t + \sin t)\right]}$$