

113-1 ENGINEERING MATHEMATICS HW3

Part I: Use Definition 4.1.1 to find $L\{f(t)\}$.

1. $f(t) = e^{-t} \sin t$

Part II: Use Theorem 4.1.1 to find $L\{f(t)\}$.

2. $f(t) = e^t \sinh t$

Part III: Find $L\{f(t)\}$ by first using a trigonometric identity.

3. $f(t) = 2 \sin^2 \frac{t}{2}$

Part IV: Find the given inverse transform.

4. $L^{-1}\left\{\frac{s+1}{s^2-4s}\right\}$

5. $L^{-1}\left\{\frac{6s+3}{s^4+5s^2+4}\right\}$

Part V: Use the Laplace transform to solve the given Initial-value problem.

6. $y'' - 4y' + 4y = t^3 e^{2t}, y(0) = 0, y'(0) = 0$

Part VI: Find either $F(s)$ or $f(t)$.

7. $L\left\{e^{3t} \left(9 - 4t + 10 \sin \frac{t}{2}\right)\right\}$

8. $L^{-1}\left\{\frac{(s+1)^2}{(s+2)^4}\right\}$

Part VII: Use the Laplace transform to solve the given integral equation.

9. $f(t) = te^t + \int_0^t \tau f(t - \tau) d\tau$

Part VIII: Find the convolution $f * g$ of the given functions. After integrating find the Laplace transform of $f * g$.

10. $f(t) = \cos 2t, g(t) = e^t$