

## PRACTICE MIDTERM I

1. Determine Laplace transform of  $te^{5t} \cos(t) + t$ .
2. Determine Laplace transform of  $t^3 \cos(t) - 1$ .
3. Determine the inverse Laplace transform of  $\frac{7s^2+23s+30}{(s-2)(s^2+2s+5)}$ .
4. Solve using Laplace transformation  $y'' - 3y' + 2y = \cos(t)$ ,  $y(0) = 0$ ,  $y'(0) = -1$ .
5. Determine the inverse Laplace transform of  $\frac{e^{-3s}(s-5)}{(s+1)(s+2)}$ .
6. Find the inverse Laplace transform of  $\frac{s+1}{(s^2+1)^2}$ .
7. Solve  $y'' + 2y' + 2y = \delta(t - \pi)$ ,  $y(0) = 1$ ,  $y'(0) = 1$ .
8. Solve  $x' + y = x$ ,  $2x' + y'' = u(t - 3)$ ,  $x(0) = 0$ ,  $y(0) = 1$ ,  $y'(0) = -1$ .

## PRACTICE MIDTERM II

1. Determine Laplace transform of  $\cos^2(t)$ .
2. Determine Laplace transform of  $t^2 e^t \sin(t) - t^5$ .
3. Determine the inverse Laplace transform of  $\frac{7s^2-41s+84}{(s-1)(s^2-4s+13)}$ .
4. Solve using Laplace transformation  $y'' + y' - y = t^3$ ,  $y(0) = 1$ ,  $y'(0) = 0$ .
5. Determine the inverse Laplace transform of  $\frac{e^{-s}}{s^2+9}$ .
6. Calculate  $\cos(t) * \cos(t)$  as a function of  $t$  and write down the Laplace transform of it using convolution theorem.
7. Solve  $y'' - y = 4\delta(t - 2) + t^2$ ,  $y(0) = 0$ ,  $y'(0) = 2$ .
8. Solve  $x' - y' = u(t - \pi) \sin(t)$ ,  $x + y' = 0$ ,  $x(0) = y(0) = 1$ .