工程數學 HW4

Deadline: 6/6 17:00

(1~4) Find the general solution of the following systems. For each solution, you should show all real bases.

1. $\begin{cases} y_1' = y_1 - 2y_2 \\ y_2' = 3y_1 - 4y_2 \end{cases}$

2. $\begin{cases} y_1' = y_1 + y_2 + y_3 \\ y_2' = 2y_1 + y_2 - y_3 \\ y_3' = -8y_1 - 5y_2 - 3y_3 \end{cases}$

3. $\begin{cases} y'_1 = 4y_1 + 3y_2 + t \\ y'_2 = -2y_1 - y_2 - 2t \end{cases}$

4. $\begin{cases} y_1' = 10y_1 - 6y_2 + 10 - 10t - 10t^2 \\ y_2' = 6y_1 - 10y_2 + 4 - 20t - 6t^2 \end{cases}$

5. Find the inverse transforms of the following function by convolution.

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

6. Use Laplace transform to find $y(t)$.

$y'' - y' = e^t \cos t, y(0) = 0, y'(0) = 0$

7. Solve the integral equation by Laplace Transforms.

$f(t) = \sin 2t + \int_0^t f(\tau) \sin 2(t - \tau) d\tau$

8. Find the Laplace transform of the given function.

$f(t) = \begin{cases} 0, if\ 0 < t < 2 \\ t - 3, if\ 2 < t < 3 \\ -1, if\ 3 < t \end{cases}$

9. $f(t) = t \cos 2t, F(s) = ?$

10. $F(s) = \frac{2S^2 - 6S + 7}{S^3 - 4S^2 + 7S}, f(t) = ?$