1. (10%)Find the solution of the $\dfrac{dy}{dx} = \dfrac{4-2x}{3y^2-5}$

2. (10%)Find the solution of the $x\dfrac{dy}{dx} + 6y = 3xy^{4/3}$

3. Solve the initial value problem $y'' - 4y = 2e^{2x}$

   (5%) (a) General solution

   (15%) (b) Particular solution

4. Find the Laplace transform of

   (5%) (a) $\mathcal{L}\{t\}$

   (5%) (b) $\mathcal{L}\{\cos 2t\}$

5. Find the Laplace transform of

   (5%) (a) $\mathcal{L}\{\dfrac{\sin 2t}{t}\}$

   (5%) (b) $\mathcal{L}\{te^{-t}\}$

6. (10%) Determine the inverse of the matrix

$$A = \begin{bmatrix} 1 & -1 & -2 \\ 2 & -3 & -5 \\ -1 & 3 & 5 \end{bmatrix}$$

7. (5%)　(a) Find the norm of the vector (2, -1, 3).

   (5%)　(b) Normalize the vector (2, -1, 3).

8. (10%) Rewrite the system of equation to a matrix form and find the reduced echelon form of the matrix

$$x_1 + 2x_2 - x_3 + 3x_4 = 4$$
$$2x_1 + 4x_2 - 2x_3 + 7x_4 = 10$$
$$-x_1 - 2x_2 + x_3 - 4x_4 = -6$$

9. (10%) Find the value of $e^{1+\pi i} =$