(1) Find the general solution of the following system

$$\begin{cases} y_1' = 5y_1 + 3y_2 + t \\ y_2' = -6y_1 - 4y_2 \end{cases}$$

(2) Solve the following IVP

$$\begin{cases} y_1' = 2y_1 - y_2 + e^{2t} \\ y_2' = y_1 + 2y_2 - e^{2t} \\ y_1(0) = 0 \\ y_2(0) = 1 \end{cases}$$

(3) Show that if A is an $n \times n$ real matrix and $v = (x_1, \ldots, x_n)^t$ is column vector then

$$|Av| \le |A| \cdot |v|$$