國立虎尾科技大學九十七學年度研究所（碩士班）考試入學試題

所別：自動化工程系碩士班
科目：考試科目 1 (工程數學)

注意事項：
（1）本試題共有五題，每題二十分，共一百分。
（2）請依序作答在答案卷上並註明題號。

1. Find an Integrating Factor and solve the following initial value problem:

$$(\cos wx + w\sin wx)dx + e^x dy = 0, \quad y(0) = 2$$

2. Find a general solution of the following equation:

$$y''' - 2y'' - 4y' + 8y = e^{2x}$$

3. Find the function f(t) if its Laplace transform F(s) equals:

(a) $\dfrac{3}{s^2}\left(\dfrac{s+1}{s^2+9}\right)$ 　　 (b) $\ln\left(\dfrac{s^2+3}{(s^2-1)}\right)$

4. $A = \begin{bmatrix} -5 & 2 \\ 2 & -2 \end{bmatrix}$, Find (a) e^A (b) A^{10}, by eigenvalue method.

5. Solve the following equation:

$$y_1'' = 4y_1 + 8y_2, \quad y_1(0) = 8, \quad y_1'(0) = -18$$
$$y_2'' = 5y_1 + y_2, \quad y_2(0) = 5, \quad y_2'(0) = -21$$