國立雲林科技大學 104 學年度 硕士班招生考試試題	系所：機械系 科目：工程數學(1)

(1) Consider the 1st order O.D.E.

$$y + 4xy' = 0$$

Please find

(a) the general solution by using separable method (10%);

(b) the integrating factor of the O.D.E. (10%);

(c) the unique solution that satisfies the initial condition $y(1) = 2$ (5%)

(2) If $f(t)$ is a function defined for all $t \geq 0$, the Laplace transform of f is defined by

$$\mathcal{L}\{f(t)\} = \int_0^\infty e^{-st} f(t) dt$$

For all s such that this integral converges. Please find the Laplace transform of the following functions using the definition above.

(a) $f(t) = \sin(2t)$ (10%)

(b) $f(t) = 3e^{-t}$ (15%)

(3)　　(25%)

Please find the <u>tangent plane</u> and <u>normal line</u> to the surface $z = x^2 + y^2$ at the point $(2, -2, 8)$.

(4)　　(25%)

Given $A = \begin{bmatrix} 1 & 1 & -2 \\ -1 & 2 & 1 \\ 0 & 1 & -1 \end{bmatrix}$, Please find

(1) The eigenvalues of A.

(2) A^N for a given positive integral N.