國立中央大學 108 學年度碩士班考試入學試題

所別： 土木工程學系 碩士班 力學與結構工程組(一般生)　　共 1 頁　第 1 頁

科目： 工程數學

本科考試禁用計算器　　※計算題需計算過程，無計算過程者不予計分

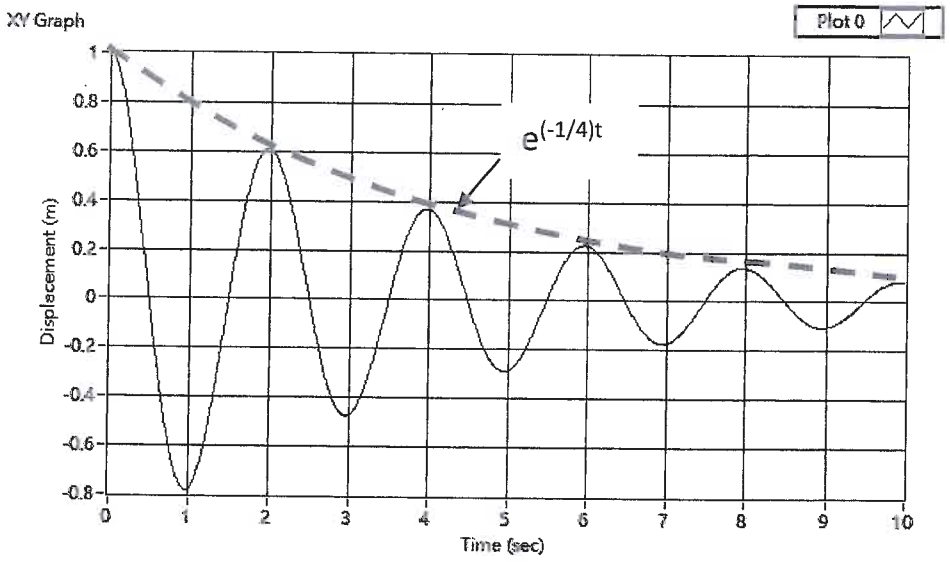
1. 試證明 $D=X^{-1}AX$ (25%)

(D is diagonal, with the eigenvalues of A as the entries on the main diagonal. Here X is the matrix with these eigenvectors as column vectors.)

2. 請描述 Green 定理並證明 $\iint_R \nabla^2 w dxdy = \oint_c \frac{\partial w}{\partial n} ds$ (25%)

3. let mass-spring-damping system with mass=2 kg, k =20 kg/s^2, and damping constant c is unknown:

(1) If the envelope of displacement is shown as following Fig. with y(0) = 1 m, y'(0)=0m/s, please find damping constant c (10%)



(2) If the upper system has an applied external force = cosωt, please find the ω_{max} to have the maximum amplification (15%)

(3) If the upper applied external force cosωt only exists at $0 \le t \le 2\pi$, please find the related displacement (15%)

(4) If the upper system is undamped and homogeneous one, please reform the ODE and use the concept of Eigenvalue problem for system ODE to solve the related displacement (10%)