

國立臺灣師範大學 113 學年度碩士班招生考試試題

科目：工程數學

適用系所：電機工程學系

注意：1.本試題共 1 頁，請依序在答案卷上作答，並標明題號，不必抄題。2.答案必須寫在指定作答區內，否則依規定扣分。

1. Please solve the following differential equation (10 points)

$$x^2 y'' - 2y = 0$$

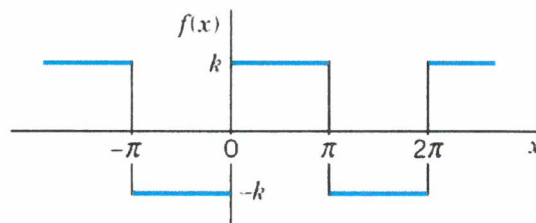
2. Please solve the following differential equation (20 points)

$$xydx + (2x^2 + 3y^2 - 20)dy = 0$$

3. Please derive the following Laplace transform (20 points)

$$L \left\{ \int_0^t e^{\tau} \sin(t - \tau) d\tau \right\}$$

4. Find the Fourier coefficients of the function $f(x)$ which is a periodic rectangular waveform with period 2π (20 points)



5. Are the following statements true or false? (30 points)

- 1) For any matrix A , the dimension of its row space equals to its rank
- 2) For a square matrix A , if its reduced row-echelon form is an identity matrix I , A may be rank deficient.
- 3) For an orthogonal matrix, the absolute value of its determinant must be 1.
- 4) A square matrix A and its reduced row-echelon form have the same the absolute value of the determinants.
- 5) The basis comprises independent vectors.
- 6) For a matrix A with $\det(A)=0$, it is still possible to invert this matrix