

Ma 221 - Exam III review

Laplace Transforms

Definition

$$\begin{aligned}\mathcal{L}\{f(t)\} &= \int_0^{\infty} e^{-st}f(t)dt \\ &= F(s) = \hat{f}(s)\end{aligned}$$

Calculate Laplace Transform from definition

Properties

$$\begin{aligned}\mathcal{L}\{y'(t)\} &= s\mathcal{L}\{y\} - y(0) \\ \mathcal{L}\{y''(t)\} &= s^2\mathcal{L}\{y\} - sy(0) - y'(0)\end{aligned}$$

Inverse Laplace Transform

Partial Fractions

Use of Laplace transform for a solution of initial value problems

Power series solution of ordinary differential equations

Recurrence relation

Eigenvalues and eigenfunctions

$$DE : \quad L[y] + \lambda y = 0$$

$$BC : \quad \alpha_1 y(a) + \beta_1 y'(a) = 0$$

$$BC : \quad \alpha_2 y(b) + \beta_2 y'(b) = 0$$

Three cases to be examined (discriminant positive, zero or negative)