

FINAL EXAM

You should be prepared to

- ① Find the Laplace transform of a piecewise continuous function of exponential order using the definition

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

- ② Use the table (Table 6.2.1 on page 252) to find the Laplace transform of f and the inverse Laplace transform of $F(s)$.

- ③ Solve first and second order ODEs using the Laplace transform.

1-3 are sections 6.1 and 6.2

- ④ Understand how the second order system

$$mu'' + \gamma u' + ku = F(t)$$

describes - (i) free undamped oscillations ($F(t)=0$ and $\gamma=0$)

(ii) free damped oscillations ($F(t)=0$, $\gamma \neq 0$)

↳ Understand the concepts of

1. Overdamping
2. Underdamping
3. Critical damping

* You should be able to set up and solve the second order problem describing the mechanical oscillations.

4 is sections 3.7 and 3.8

⑤ Solve first order problems of the form $y' = f(t, y)$

Here there are several techniques

- Separable
- Integrating factor
- Bernoulli Type
- Method of Exact Equations.