

AAE 340

Dynamics and Vibrations

Exam 2

# Practice Exam

**Instructions:**

The exam is worth a total of 100 points. Work as quickly and accurately as you can.

Write your name at the bottom of this page.

**DO NOT TURN THE PAGE UNTIL**

**INSTRUCTED TO DO SO**

Note: Partial Credit can only be given for

1. Correct partial steps toward the complete solution, which are
2. Clearly labeled in a logical and **systematic** manner.

Name \_\_\_\_\_

**I. Thrusting Rocket Problem (35 points)**

A rocket is designed so that the exit pressure,  $P_e$ , is zero. Assume that the vehicle is operated in deep space where gravitational and other forces can be neglected.

**Ia.** Using a system of particles approach, show that the force exerted by the rocket is

$$F = \dot{m}_{\text{prop}} v_e$$

where  $\dot{m}_{\text{prop}}$  is the mass flow rate of propellant and  $v_e$  is the exhaust velocity.

**Ib.** Using the definition of specific impulse,  $I_{sp}$  (in seconds), show that

$$I_{sp} = v_e / g$$

I. Solution