

Name: _____

Section: _____

R.I.T SCHOOL OF MATHEMATICAL SCIENCES

29 - Second Order Applications with Laplace Transforms

MATH 211

1. A mass of 2kg is attached to a spring with spring constant 8N/m. An external force given by $f(t) = 4u(t - 2)$ initially stretches the spring 1m. The spring is then released with no initial velocity. Find the equation of motion $x(t)$ assuming no damping.
 - (a) Set up a differential equation modeling the scenario.
 - (b) Solve the differential equation using Laplace Transforms to find the displacement of the spring as a function of time.
2. A simple pendulum rotates around a point, Q . The pendulum rod is $l = \frac{1}{2}$ feet long and is released from rest at $\theta(0) = \pi/3$ radians. An electromagnet giving off a force of 2 lb is mounted directly below the mass when at equilibrium and is shut off after 3 seconds.
 - (a) Find a function for the force exerted by the electromagnet.
 - (b) Set up a differential equation modeling the scenario.
 - (c) Solve the differential equation using Laplace Transforms to find angular displacement as a function of time.