Name: _____

Section: _____

R·I·T School of Mathematical Sciences

Homework 8

MATH 211

1. A 1 kg mass is attached to a spring with spring constant 4 kg/m. The mass is initially released from rest from a point 1 m below equilibrium position. Find the equation of motion of the mass if an external force of $6e^{-t}$ N is turned on after 4 seconds. Assume the absence of damping.

2. Suppose an electrical circuit contains a 1 H inductor, a 20 Ω resistor and a capacitor rated at $^1/_{100}$ F. The circuit is hooked up to an alternating voltage source described by $E(t) = 81 \sin t$ V which is turned off after π seconds. If initially $q(0) = 0$ C and $i(0) = 0$ A, find a function that describes the charge as a function of time.

3. A tank contains 100 gallons of pure water. Five gallons of brine flow into the tank per minute and each gallon contains 1 pound of salt. The solution inside the tank is kept well-stirred and flows out at the same rate as in. At $t = 6$ seconds, 4lb of salt is also instantaneously dumped into the tank. Find the amount of salt in the tank as a function of time t.