

Math 1B: Worksheet 8

Section 17.3: Applications

You may use the equations:

undamped vibrations	$mx'' + kx = 0$ with $F = -kx$
damped vibrations	$mx'' + cx' + kx = 0$
forced vibrations	$mx'' + cx' + kx = F(t)$
electric circuits	$LQ'' + RQ' + (1/C)Q = E(t)$

1. A series circuit contains a resistor with $R = 40\Omega$, an inductor with $L = 2$ H, a capacitor with $C = .0025$ F, and a 12-V battery. The initial charge is $Q = .01$ C and the initial current is 0. Find the charge at time t .

2. A spring with a mass of 2 kg has damping constant 16, and a force of 12.8 N keeps the spring stretched 0.2 m beyond its natural length. Find the position of the mass at time t if it starts at the equilibrium position with a velocity of 2.4 m/s.

Section 17.4: Series Solutions

For the following problems, assume there exists a solution of the form $y(x) = \sum_{n=0}^{\infty} c_n x^n$ and determine what the constants must be.

1. $y'' + y = 0$

2. $y'' - 2y' + y = 0$

3. $y'' - 2xy' + y = 0$

4. $y'' = xy$