

Massachusetts Institute of Technology  
Department of Electrical Engineering and Computer Science

6.002 - Electronic Circuits  
Fall 2000

Homework #10  
Handout F00-52

Issued 11/9/2000 - Due 11/22/2000

**Readings:** Chapter 13, Chapter 14, Sections 15.1-15.3

**Exercise 10-1:** Chapter 14, Exercise 14.7, parts b, c, and d only; (page 825).

Note the terminology “natural frequency” in part (d). The definition of natural frequency is the value of  $s_0$ , in a waveform of the form  $e^{s_0 t}$ , that satisfies the homogenous differential equation. For example, if

$$\frac{dV}{dt} + \frac{V}{\tau} = 0$$

then  $e^{s_0 t}$  is a homogenous solution when the natural frequency  $s_0 = -\frac{1}{\tau}$ .

**Exercise 10-2:** Chapter 15, Exercise 15.2 (page 873).

**Problem 10-1:**

Assume that the network in Figure 1 is in sinusoidal steady state. Determine the response  $v_{OUT}(t)$  to the input  $v_{IN}(t) \equiv V_{SI} \cos(\omega_S t)$ . Note that  $v_{OUT}(t)$  will take the form  $v_{OUT}(t) = V_{SO}(\omega_S) \cos(\omega_S t + \phi_S(\omega_S))$ .

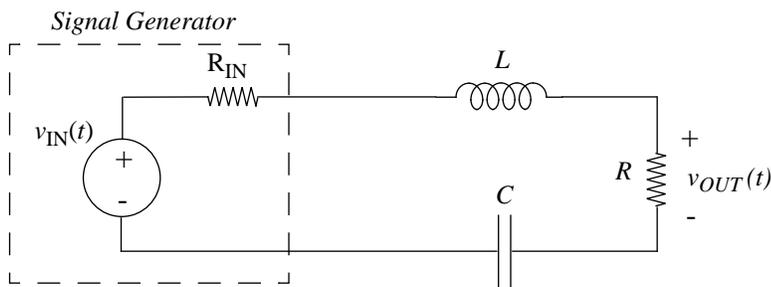


Figure 1

*The results of this problem will be used in the Pre-Lab of Lab 3.*

**Problem 10-2:** Chapter 14, Problem 14.16, parts a,b, and c only; (page 834).

**Problem 10-3:** Chapter 15, Problem 15.1 (page 881).