

**Massachusetts Institute of Technology  
Department of Mechanical Engineering**

**2.010 Modeling, Dynamics, and Control III  
Spring 2002**

Reading Nise

Chapter 10  
10.1-10.2

***Problem Set #9***

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**Due: Friday, April 26, 2002**

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**Problem 1**

For each of the following transfer functions:

a) 
$$G(s) = \frac{10}{s(s+2)(s+5)}$$

b) 
$$G(s) = \frac{(s+10)}{(s+1)(s+50)}$$

c) 
$$G(s) = \frac{s(s+30)}{(s^2+5s+25)}$$

- i) Derive the analytical expressions for magnitude and phase angle as a function of the excitation frequency
- ii) On appropriate graph paper (log - log or semi-log) create asymptotic sketches of each of the above transfer functions
- iii) Use the analytical expressions to determine the exact values for gain only at the breakpoints.