

Inter American University of Puerto Rico
Bayamón Campus
School of Engineering
Department of Electrical Engineering

ELEN 3302 – Electric Circuits II

Problem Set 2

Due Wednesday, September 1

Additional references for the class:

- Alan V. Oppenheim & Alan S. Willsky, *Signals & Systems*, Prentice Hall Signal Processing Series, Prentice-Hall, Inc., New Jersey, 1997.
- Leon O. Chua, Charles A. Desoer & Ernest S. Kuh, *Linear and Nonlinear Circuits*, McGraw-Hill Series in Electrical Engineering, McGraw-Hill, Inc., New York, 1987.

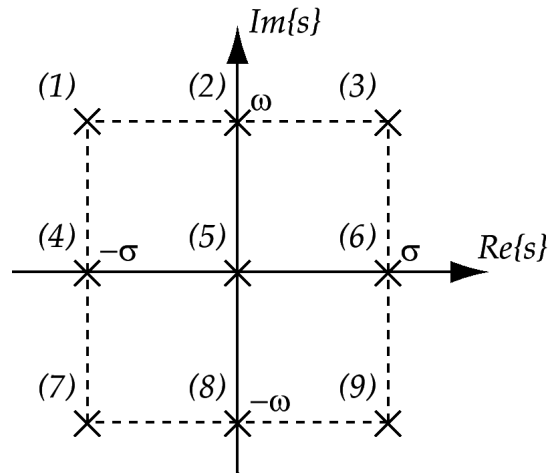
Problem 1: Find the particular solution of $x(t)$ in

$$a \frac{d^2}{dt^2} x(t) + b \frac{d}{dt} x(t) + cx(t) = \cos \omega t$$

assuming as a solution:

- (A) $x(t) = K \cos(\omega t + \phi)$, where K and ϕ are real.
- (B) $x(t) = K e^{j\omega t} + K^* e^{-j\omega t}$, where K and K^* are complex and K^* denotes the complex conjugate of K .

Problem 2: Provide an algebraic expression and a qualitative sketch of the real part of the complex time function for each of the complex frequencies marked with an $\times$ in the s -plane shown below:



Problem 3: Provide an algebraic expression for the sinusoidal steady-state of $i(t)$ and $v(t)$ if $v_S(t) = V_S \sin \omega t$.

