Assignment 1

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***Problem Set 1***

**Problem Set 1-1:**

Calculate.

% a.

23^4 - 4 \* 13^.5

% b.

4 \* pi - 18^3

% c.

log10(37)

% d.

log(37)

% e.

sin(1)

% f.

cosd(60)

% g.

exp(2)

% h.

atan(1/2)

% i.

log2(64)

% j.

nthroot(32,5)

% k.

1 / sqrt(2) - nthroot(5,3)

**Results**

a) 2.7983e+05

b) -5.8194e+03

c) 1.5682

d) 3.6109

e) 0.8415

f) 0.5000

g) 7.3891

h) 0.4636

i) 6

j) 2

k) -1.0029

**Problem Set 1-2:**

Find the area of a circle with radius 5 inches.

radius = 5; % radius in inches.

area = pi \* radius^2 % area in inches squared.

**Results**

Area = 78.5398 inches squared

**Problem Set 1-3:**

Use the formulas V = I R (Ohm’s Law) and P = V2/R to find the voltage (V) across and power (P) dissipated by a resistor if the current (I) through the resistor is 5 amps and the resistor value R is 100 ohms.

R = 100; % resistance in Ohms.

i = 5; % current in Amps.

v = i \* R

p = v^2 / R

**Results**

V = 500 volts

P = 2500 watts

***Problem Set 2***

**Problem Set 2-1:**

Find the angle,, for the number: x = 1 + j.

degX = atan2d(sqrt(5),1) % theta = arctan(b/a) in degrees

**Results**

= 65.9052

**Problem Set 2-2:**

Find the magnitude of the complex number x above.

x = 1 + sqrt(5) \* j; % define cartesian coordinates

magX = abs(x) % find magnitude

**Results**

Magnitude = 2.4495

**Problem Set 2-3:**

Write x in the form re^j.

**Results**

**Problem Set 2-4:**

Change to polar form: y = 5 + 12j.

**Results**

**Problem Set 2-5:**

Change to Cartesian Coordinates: 2e^j60.

**Results**

**Problem Set 2-6:**

Change to Cartesian Coordinates: 4e^0.2j.

**Results**

**Problem Set 2-7:**

Simplify: (4+j)/(5 – 2j), and write the answer in polar and rectangular form.

=

**Results**

**Problem Set 2-8:**

Simplify: (4+2j) \* (2 + 5j), and write the answer in polar and rectangular form.

**Results**

**Problem Set 2-9:**

Use phasors and MATLAB to find the impedance seen by the source and the current coming out of the source if the source voltage is: V(t) = 10 sin(2\*pi\*100t).

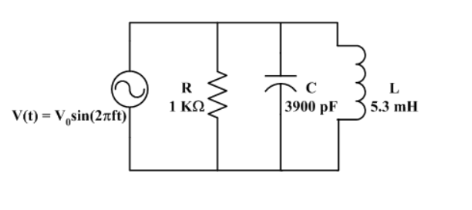
% Program Name: phasers.m

% Author: Juan Silva Last Modified: Jan. 30, 2018

% Description: This program calculates the impedance of the specified circuit and plots the waveforms.

clear, clc, close all

format short, format compact



% \*\*\* Define variables \*\*\*

R = 1e3; % Ohms

C = 3900e-12; % Farads

L = 5.3e-3; % Henries

Vs = 10; % Volts

freq = 100; % Hertz

% \*\*\* Start Code \*\*\*

w = 2 \* pi \* freq; % Omega

xL = j \* w \* L; % Impedence through inductor

xC = -j / (w \* C); % Impedence through capacitor

y = 1/R + 1/xL + 1/xC; % total admittance

z = 1/y % total impedence

[zAng, zMag] = cart2pol(real(z),imag(z)) % get mag and deg (in rad)

zAngDeg =rad2deg(zAng) % convert rad to deg

current = Vs / z % current

[CurrentAng, CurrentMag] = cart2pol(real(current),imag(current))

currentAngDeg = rad2deg(CurrentAng) % convert to polar

phase = (( 0.0075 - 0.005) / 0.01) \* 360 % (dT / T) \* 2pi

% \*\*\* Start Plots \*\*\*

t = 0 : 0.0001 : 0.02; % time in seconds

Vt = 10 \* sin(2\*pi\*freq\*t); % voltage

It = 3.1831 \* sin(2\*pi\*freq\*t - 1.5677); % current

plot(t, Vt,'r', t, It, 'b--')

grid

title('Voltage and Current Waveforms')

xlabel('Time (s)')

legend('Vs(t)', 'Is(t)')

**Results**

Total Impedance = 0.0111 + 3.3301i Ohms

Current = 0.01 – 3.0029i Amps  
Phase Angle = 90

