

**Homework 1**  
**EE 220 Circuits I Fall 2017**  
**Wednesday, August 23, 2017**

- 1) PP1.3
- 2) PP1.4
- 3) 1.6
- 4) 1.11
- 5) 1.19
- 6) 1.28

For problems 7 - 9, your job is to start learning how to perform basic complex number operations, solve a system of linear equations, and find polynomial roots using your **calculator**. You may use another tool/solution method, e.g., MathCad<sup>®</sup> and Matlab<sup>®</sup>, to check your answers. Appendixes A & B and the **course web page** have some useful background material. This is also an exercise in learning to use resources such as owner's manuals, program help files, the internet, colleagues, ...

- 7) Solve the following problems involving complex numbers. Note, the solutions have been given for the first two to allow you to check your solution method. State which tool(s) you chose to use to obtain your solutions (e.g., what calculator you used).
  - a)  $(3+j7) * (-4-j2) = 2-j34$
  - b)  $(33\angle 45^\circ) / (3\angle -60^\circ) = (11\angle 105^\circ)$
  - c)  $(5-j9) + (-8+j3)$  (express answer in rectangular format)
  - d)  $(6\angle 55^\circ) + (4\angle -135^\circ)$  (express answer in polar/phasor format with angle in degrees)
  - e)  $(7-j4) * (4\angle -55^\circ)$  (express answer in both formats)
  - f)  $(6.4\angle 75^\circ) / (-2+j3)$  (express answer in both formats)
  - g)  $e^{(-0.3 + j2\pi/3)}$  (express answer in both formats)
  
- 8) Solve the following systems of linear equations. State which tool(s) you chose to use to obtain your solutions. Note, the first two are easy and should be used to check your solution method. Express complex answers in **both** formats.
 

<ol style="list-style-type: none"> <li>a) <math>2x + 3y = 5</math>  <math>x + 2y = 7</math>  <math>[x = -11, y = 9]</math></li> <li>c) <math>2t - 3u + 3v = 5</math>  <math>-4t + 6u - 2v = 9</math>  <math>3t - 7u + 9v = 12</math></li> </ol>	<ol style="list-style-type: none"> <li>b) <math>(8-j6)w + (3\angle 25^\circ)z = 12\angle -20^\circ</math>  <math>(3.2\angle 45^\circ)w - (6-j3)z = -(3\angle 40^\circ)</math>  <math>[w = 1.379 + j0.111, z = 0.336 + j1.051]</math></li> <li>d) <math>(6\angle 125^\circ)r + (8+j6)w + (7\angle 25^\circ)z = 12\angle -60^\circ</math>  <math>(4+j8)r + (7\angle 25^\circ)w + (7-j3)z = 18\angle 30^\circ</math>  <math>(12+j4)r + (6\angle -45^\circ)w + (3\angle 125^\circ)z = 8\angle 10^\circ</math></li> </ol>
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- 9) Find the roots of the following polynomials. State which tool(s) you chose to use to obtain your solutions. Express complex answers in **rectangular** format.
  - a)  $s^2 + 10s + 20 = 0$
  - b)  $2s^2 + 120s + 1800 = 0$
  - c)  $s^2 + 20s + 200 = 0$

**Due Monday, August 28, 2017**