

SAMPLE SOLUTION WRITEUPS FOR ECE 209

SPRING 2000

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Your solutions to the problems in the investigations need to make clear

1. What each problem is with an underlined "headline" like those in the examples below
2. What is given
3. How you're solving the problem
4. What your answer is

EXAMPLE SOLUTION WRITEUPS FOR INVESTIGATION 1

1. Adding and multiplying the complex numbers $z_1 = 1 + j2$ and $z_2 = 3 - j$

- a. $z = z_1 + z_2 = (1 + j2) + (3 - j) =$
- b. $z = z_1 z_2 = (1 + j2)(3 - j) =$

3. Relationship between the rectangular coordinates of $z = x + jy$ and its location in the complex plane

x is the . . .
y is the . . .

SAMPLE SOLUTION WRITEUPS FOR INVESTIGATION 2

1. Multiplying and dividing of complex exponentials

When we multiply complex exponentials as follows

$$r_1 e^{j\theta_1} r_2 e^{j\theta_2} = r_1 r_2 e^{j(\theta_1 + \theta_2)}$$

we just like we do when we multiply real exponentials

And when we divide complex exponentials as follows

$$\frac{r_1 e^{j\theta_1}}{r_2 e^{j\theta_2}} = \frac{r_1}{r_2} e^{j(\theta_1 - \theta_2)}$$

we just like we do when we divide real exponentials

3. Using Euler's Relation to prove $\frac{d e^{jbt}}{dt} = j b e^{jbt}$

$$\frac{d e^{jbt}}{dt} = \frac{d}{dt} (\cos(bt) + j b \sin(bt)) = \dots$$

SAMPLE SOLUTION WRITEUPS FOR INVESTIGATION 3

1. Fixing some common mistakes

- a. $V(j100) = 5e^{j0.4}e^{j100t}$ should be $V(j100) =$
- b. $V(j100) = \text{Re} [5e^{j0.4}e^{j100t}]$ should be $V(j100) =$
- c. $v(t) = 5e^{j0.4}e^{j100t}$ should be $v(t) =$

4. Finding voltages equal to the real parts of complex exponentials

a. $v(t) = \text{Re} \left[\frac{5 + j2}{j3} e^{j100t} \right] = \text{Re} [1.8e^{-j1.2} e^{j100t}] =$