

# DIGITAL SIGNAL PROCESSING: COSC390

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**Complex conjugation.** Prove the following complex conjugation for  $z_1 = x_1 + jy_1$  and  $z_2 = x_2 + jy_2$ :

$$\left( \frac{z_2}{z_1} \right)^* = \frac{x_2 - jy_2}{x_1 - jy_1} \quad (1)$$

**Complex numbers, graphing.** For the previous problem, let  $x_1 = -1$ ,  $y_1 = 1$ ,  $x_2 = 1$ , and  $y_2 = -1$ . Graph the numbers  $z_1$ ,  $z_2$ , and  $z_2/z_1$ .

**Complex numbers, polar form.** Convert the following complex numbers to polar form.

1.  $1 + j$
2.  $2 + 2j$
3.  $2 - 2j$

Notice that the second and third example are complex conjugates. What is the magnitude and phase angle of each number?