Ben Ridenbaugh

5-1. a. $V_R = 1 + 0j$ $V_L = 0 + 1j$

b. $V = (1 + 0j) + (0 + 1j) = 1 + 1j$

$|V| = \sqrt{1^2 + 1^2} = \sqrt{2}$

$\theta = \tan^{-1}(1) = 45°$ $V = \sqrt{2} \angle 45°$

c.

5-16 a. $Z_1 = 10 + 25j$ $Z_2 = 5 + 15j$

$Z = (10 + 25j) + (5 + 15j) = 15 + 40j$

b. $|Z| = \sqrt{(15)^2 + (40)^2} = 42.72$

$\theta = \tan^{-1}(40/15) = 69.44°$

$Z = 42.72 \angle 69.44°$

5-19. a. $Z_1 = 100\Omega + 0j$ $Z_2 = 0 + 5.65j$ $Z_3 = 0 + 7073.55j$

$Z_2 + Z_3 = (0 + 5.65j) + (0 + 7073.55j)$

$= 0 + 7079.21j$

7. Polar: 7079.21 $\angle$ DNE ?

b. $Z_1 + Z_2 + Z_3 = 100 + 7079.21j$

$|Z_1 + Z_2 + Z_3| = 7079.91$ $\theta = \tan^{-1}(7079.21/100) = 8$

7079.91 $\angle$ 89.19°

c. $\dfrac{Z_2 + Z_3}{Z_1 + Z_2 + Z_3} = \dfrac{0 + 7079.21j}{100 + 7079.21j} = 0 + 1j$

1 $\angle$ DNE?

d. conjugate: $0 - 1j$

$ZZ^* = (0$

5-24. a. $Z_R = 120 + 0j$ $Z_L = 0 + 120\sqrt{3}j$ $Z_C = 0 + \frac{1}{50\sqrt{3}}j$

120 $\angle$ 0° $120\sqrt{3} \angle$ DNE $\frac{1}{50\sqrt{3}} \angle$ DNE

b. $Z = 0 + \frac{1}{50\sqrt{3}}j + \dfrac{120\sqrt{3}(0 + 120\sqrt{3})}{120 + 0j + 0 + 120\sqrt{3}j} = \frac{1}{50\sqrt{3}}j + \dfrac{24941.53}{120 + 120\sqrt{3}j}$

$= \frac{1}{50\sqrt{3}}j + 207.84 + 360j = 207.84 + 360.03j$

$|Z| = 415.71$ $\theta = \tan^{-1}(360.03/207.84) = 6$

415.71 $\angle$ 60°

C. conjugate: $207.84 - 360.03j$

$ZZ^* = (415.71 \angle 60°)(415.71 \angle -60°)$

$= 172819.07$

5-31. a. $Z_R = 1000 + 0j$ $Z_L = 0 - 1000j$

$1000 \angle 0°$ $1000 \angle DNE$

b. $I_1 = \dfrac{0 - 1000j}{1000 - 1000j}$ $I_2 = \dfrac{1000 + 0j}{1000 - 1000j}$

$= 0 + 1j$ $= 1 + 0j$

$1 \angle DNE$ $1 \angle 0°$

c. $I = 0 + 1j + 1 + 0j = 1 + 1j$

5-38 $Z_1 = \dfrac{(10 - 0)(0 - 20j)}{30 - 32j} = 0 + 6.66j$ $6.66 \angle DNE$

$Z_2 = \dfrac{(10 - 0j)(20 - 10j)}{30 - 30j} = 6.66 + 3.33j$ $7.45 \angle 26.56°$

$Z_3 = \dfrac{(0 - 20j)(20 - 10j)}{30 - 30j} = 0 + 20j$ $20 \angle DNE$