ECE 210 - F00 Solutions Appendix C 1/1 & Chapter 9

1. a) $3.61 \angle 33.69°$
b) $3.61 \angle 56.31°$
c) $7.07 \angle 98.13°$
d) $7.07 \angle -8.13°$
e) $7.07 \angle -98.13°$
f) $7.07 \angle 81.87°$
g) $7.07 \angle 8.13°$
h) $7.07 \angle 171.87°$

use $|z| = \sqrt{x^2+y^2}$ and $\angle z = \tan^{-1}(y/x)$ watch quadrant!

2. a) $6.58 + j2.39$
b) $-6.58 - j2.39$
c) $-6.58 - j2.39$
d) $6.58 + j2.39$
e) $2.82 + j1.03$
f) $2.82 - j1.03$
g) $10 + j0$
h) $0 - j1$

use Euler's equation $e^{j\theta} = \cos\theta + j\sin\theta$

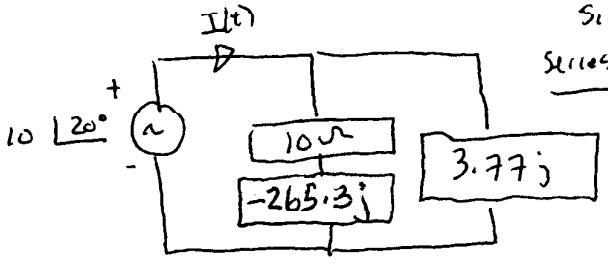
3. a) $-4 + j$
b) $3 + j$
c) $-10 + 10j$
d) $21.35 + j29.05$

4. a) $25.24 \angle 86.31°$
b) $4.12 \angle 165.96°$
c) $0.22 \angle 6.57°$
d) $.71 \angle 45°$

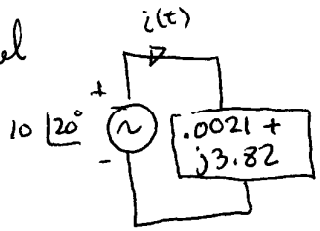
5. a) $Z_{EQ} = 35\ \Omega$ ← $Z_{EQ} = 10 + 25$
b) $= (10 - 1000j)\ \Omega$ ← $Z_{EQ} = 10 + -j/\omega \cdot C$
c) $= (10 + j)\ \Omega$ ← $Z_{EQ} = 10 + j \cdot \omega \cdot L$
d) $= (10 - j261.5)\ \Omega$ ← $Z_{EQ} = 10 + -j/\omega C + j\omega L$
e) $= (9.99 - j0.38)\ \Omega$ ← $Z_1 = 10$ $Z_2 = -j/\omega C$ in parallel
f) $= (1.62 - j3.68)\ \Omega$ ← $Z_1 = 10$, $Z_2 = -j/\omega C$, $Z_3 = j\omega L$ in parallel.

6. First write as impedances: $Z_R = 10\Omega$; $Z_C = -j/(377 \cdot 10 \times 10^{-6})$
$Z_L = j \cdot 377 \cdot 10 \times 10^{-3}$

note $\underline{V} = 10 \angle 20°$



Simplify series/parallel →



$\underline{I} = \underline{V}/Z$
$= \frac{10 \angle 20°}{.0021 + j3.82}$
$= 2.61 \angle -69.97°$

$i(t) = 2.61 \cos(377t - 69.97°)\ A$