Chapter 11, Solution 48.

(a) $\mathbf{S} = P - jQ = \mathbf{[269 - j150]\ VA}$

(b) $pf = \cos\theta = 0.9 \longrightarrow \theta = 25.84°$

$$Q = S\sin\theta \longrightarrow S = \frac{Q}{\sin\theta} = \frac{2000}{\sin(25.84°)} = 4588.31$$

$$P = S\cos\theta = 4129.48$$

$\mathbf{S = [4.129 - j2]\ kVA}$

(c) $$Q = S\sin\theta \longrightarrow \sin\theta = \frac{Q}{S} = \frac{450}{600} = 0.75$$

$\theta = 48.59$, $pf = 0.6614$

$$P = S\cos\theta = (600)(0.6614) = 396.86$$

$\mathbf{S = [396.9 + j450]\ VA}$

(d) $$S = \frac{|\mathbf{V}|^2}{|\mathbf{Z}|} = \frac{(220)^2}{40} = 1210$$

$$P = S\cos\theta \longrightarrow \cos\theta = \frac{P}{S} = \frac{1000}{1210} = 0.8264$$

$\theta = 34.26°$

$$Q = S\sin\theta = 681.25$$

$\mathbf{S = [1 + j0.6812]\ kVA}$