Chapter 11, Solution 89.

(a) Apparent power = S = **12 kVA**

$$P = S\cos\theta = (12)(0.78) = 9.36 \text{ kW}$$
$$Q = S\sin\theta = 12\sin(\cos^{-1}(0.78)) = 7.51 \text{ kVAR}$$

$$\mathbf{S} = P + jQ = \mathbf{[9.36 + j7.51]\ kVA}$$

(b) $$\mathbf{S} = \frac{|\mathbf{V}|^2}{\mathbf{Z}^*} \longrightarrow \mathbf{Z}^* = \frac{|\mathbf{V}|^2}{\mathbf{S}} = \frac{(210)^2}{(9.36 + j7.51)\times 10^3} = 2.866 - j2.3$$

$$\mathbf{Z} = \mathbf{[2.866 + j2.3]\ \Omega}$$