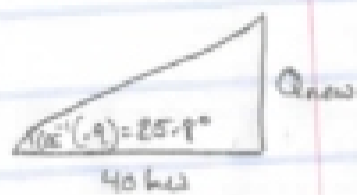
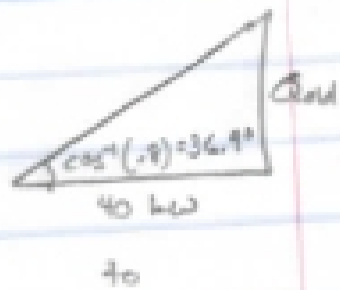


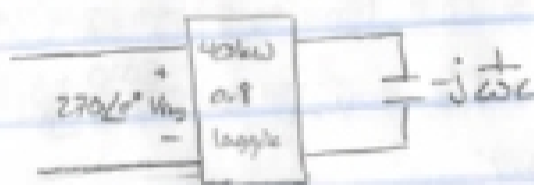
9.89) A particular load has a PF of 0.8 lagging. The power delivered to the load is 40 kW from a 270 V rms, 60 Hz line. What value of capacitance placed in parallel with the load will raise the power factor to 0.9 lagging.



$$\tan^{-1} 36.9^\circ = \frac{Q_{old}}{40 \text{ kW}} \rightarrow Q_{old} = 30 \text{ kVAR}$$

$$\tan^{-1} 25.9^\circ = \frac{Q_{new}}{40 \text{ kW}} \rightarrow Q_{new} = 19.37 \text{ kVAR}$$

$$Q_c = Q_{old} - Q_{new} \rightarrow = 30 - 19.37 \rightarrow Q_c = 10.7 \text{ kVAR}$$



$$\omega = 60 \text{ Hz} = 377 \text{ rad/s}$$

$$|Q_c| = \frac{V_{rms}^2}{Z} \rightarrow \frac{(270)^2}{(377)C} = 10.7 \text{ kVAR} \rightarrow C = 0.000389 \text{ F} = 389 \text{ mF}$$