The magnitude of the line voltage at the terminals of a balanced Y-connected load is 12,800 V. The load impedance is 216+j63 Ω/Ø. The load is fed from a line that has an impedance of 0.25+j2 Ω/Ø. Assume the sequence is negative.

a) If $V_{AB}$ is the reference voltage, what is $V_{BC}$ and $V_{CA}$

$$V_{AB} = 12,800 \angle 0^\circ \text{ V} \quad V_{BC} = 12,800 \angle 120^\circ \text{ V} \quad V_{CA} = 12,800 \angle -120^\circ \text{ V}$$

b) Find $V_{AN}$

$$V_{AN} = V_{AB} \cdot \frac{120^\circ}{\sqrt{3}} = \frac{12,800}{\sqrt{3}} \angle 120^\circ = 7390.08 \angle 33^\circ \text{ V}$$

c) What is the magnitude of the line current?

$$I_{AN} = \frac{V_{AN}}{216+j63} = \frac{12,800}{\sqrt{3}} \angle 120^\circ \quad I_{AN} = 32.64 A$$

$$|I_{AN}| = 32.645 \text{ A}$$

d) What is the magnitude of the line voltage at the source?

$$|V_{AN}| = |I_{AN}(216+j63 + 0.25+j2)| = 7416.61 \text{ V}$$

$$|V_{ab}| = \sqrt{3} |V_{AN}| = 12,845.94 \text{ V}$$

Good Luck, Dr. Ali Muqaiabel