Find P and Q.

a : 2 .

b : 1 .

Note: We've used bold capital letters to denote complex variables. The * operator stands for complex conjugate. The Re[] and Im[] operators stand for taking the real part and imaginary part respectively.

$$\mathbf{V_0} = ae^{j\frac{\pi}{6}} \qquad \mathbf{Z_1} = 2 + j \qquad \mathbf{Z_2} = bj$$

$$\mathbf{I_1} = \frac{\mathbf{V_0}}{\mathbf{Z_1}} \qquad \mathbf{V_1} = \mathbf{Z_2} \cdot \mathbf{I_1} \qquad \mathbf{S} = \frac{1}{2} \cdot \mathbf{V_1} \cdot \mathbf{I_1^*}$$

$$P = \mathrm{Re}[\mathbf{S}] \qquad Q = \mathrm{Im}[\mathbf{S}]$$

$$S = \frac{1}{2} V_1 I_1^* = \frac{1}{2} Z_2 I_1 \cdot I_1^* = \frac{1}{2} \cdot j \, |I_1|^2$$

$$I_1 = \frac{V_0}{Z_1} \Rightarrow |I_1|^2 = \frac{|V_0|^2}{|Z_1|^2} = \frac{a^2}{4+1} = \frac{4}{5}$$

$$\Rightarrow S = \frac{1}{2} \cdot j \cdot \frac{4}{5} = j \cdot \frac{4}{10}$$

$$\boxed{P = 0}$$

$$\boxed{Q = 0.4}$$