Find P and Q.

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.

a : 2.

b : 4.

$$V_1 = be^{j\frac{\pi}{3}} \qquad Z_1 = a - aj \qquad I_1 = \frac{V_1}{Z_1}$$

$$S = \frac{1}{2} \cdot V_1 \cdot I_1^* \qquad P = \text{Re}[S] \qquad Q = \text{Im}[S]$$

$$S = \frac{1}{2} V_1 I_1^* = \frac{1}{2} V_1 \frac{V_1^*}{Z_1^*} = \frac{1}{2} \frac{|V_1|^2}{Z_1^*}$$

$$S = \frac{1}{2} \cdot \frac{4^2}{2 + 2j} = \frac{4^2}{2 \cdot 2} \frac{1}{1+j} \frac{1-j}{1-j} = 4 \left(\frac{1-j}{1+1}\right) = 2(1-j)$$

$$\boxed{P = 2}$$

$$\boxed{Q = -2}$$