A 50-Ω lossless line is terminated with a load impedance $Z_L = (30 - j20) \, \Omega$.

(a) Calculate $\Gamma$ and $S$.

(b) find a value for $l_{\text{max}}$ where there is the first voltage maximum assuming a wavelength $\lambda$ of the signal.

c) It is often possible to match a load by placing an appropriately selected resistor across the line at the distance $l_{\text{max}}$ from the load (see figure), where $l_{\text{max}}$ is the distance from the load to a voltage maximum. For this value of $l_{\text{max}}$ find a value of $R$ that matches the network.