Use information from problem 2) to find the **exact**: a) input power, b) load power, c) power lost in TL, d) power from generator, and e) power consumed by Z_g.

From previous problem(s): $Z_L = 100 - j50\,\Omega$

$\gamma = 0.1427 + j82.7021\ m^{-1}$ $\quad \Gamma = \Gamma_L = 0.4464\angle -26.6981°$

$Z_0 = 50.1426\angle 0.0436°\ \Omega$ $\quad Z_g = 50 - j10\,\Omega$ $\quad V_g = 20\angle 0°\ V$

$V_0^+ = 7.6783\angle -110.876°\ V$ $\quad Z_{in} = 40.96 + j21.8158\,\Omega$

(2.89a) $V(z) = V_0^+\left[e^{-\gamma z} + \Gamma e^{\gamma z}\right] \quad -\ell \le z \le 0$

(2.89b) $I(z) = \frac{V_0^+}{Z_0}\left[e^{-\gamma z} - \Gamma e^{\gamma z}\right] \quad -\ell \le z \le 0 \qquad \ell = 2\,m$

a) $V_{in} = V(-2m) = (7.6783\angle -110.88°)\left[e^{-(0.143+j82.7)2} + 0.446\angle -26.7° e^{(0.143+j82.7)2}\right]$

$= 10.1189\angle 20.639°\ V$

$I_{in} = \frac{V_{in}}{Z_{in}} = \frac{10.1189\angle 20.639°}{40.96+j21.816} = 0.218\angle -7.401°\ A$

$P_{in} = 0.5\,Re\{V_{in} I_{in}^*\} = 0.5\,Re\{(10.12\angle 20.64°)(0.218\angle +7.4°)\}$

$$\underline{\underline{P_{in} = 0.97369\ W}}$$

b) $V_L = V(0) = V_0^+\left[e^0 + \Gamma e^0\right] = (7.68\angle -110.9°)(1 + 0.4464\angle -26.7°)$

$= 10.8503\angle -119.036°\ V$

$I_L = V_L / Z_L = \frac{10.85\angle -119.04°}{100 - j50} = 0.09705\angle -92.471°\ A$

$P_L = 0.5\,Re\{V_L I_L^*\} = 0.5\,Re\{(10.85\angle -119.04°)(0.09705\angle +92.47°)\}$

$$\underline{\underline{P_L = 0.47092\ W}}$$

c) $P_{loss} = P_{in} - P_L = 0.97369 - 0.47092$

$$\underline{\underline{P_{loss} = 0.50277\ W}}$$

d) $P_{gen} = 0.5\,Re\{V_S\, I_{in}^*\}$ from generator

$= 0.5\,Re\{(20\angle 0°\ V)(0.218\angle +7.401°)\}$

$$\underline{\underline{P_{gen} = 2.16228\ W}}$$

e) $P_{Zg} = \frac{1}{2}|I_{in}|^2 R_g = 0.5\,(0.218)^2\,50$

$$\underline{\underline{P_{Zg} = 1.18859\ W}}$$

Check to ensure Conservation of Power holds

$P_{gen} = P_{Zg} + P_{in} = 1.188$

$2.16228 \stackrel{?}{=} 1.18859 + 0.97369$

$2.16228 = 2.16228\ W$ ∴