265 Solution

a. The IM3 products are located at 1001 and 998 MHz (1/6 of problem credit).

b. The power of both IM3 products is determined from

\[ IM3 = 3P_{in} - 2IIP3 = 3 \cdot 0dBm - 2 \cdot (20dBm) = -40dBm \] (1/3 of problem credit).

c. The power of the IM3 product at 1001 MHz is reduced by 2 times the attenuation while the power of the IM3 product at 998 MHz is reduced by just the attenuation.

\[ IM3(1001MHz) = -60dBm \] (1/2 of problem credit)

\[ IM3(998MHz) = -50dBm \]
Problem ECE166:

a) Use an LC matching network to match $30+j200 \, \Omega$ to $50 \, \Omega$. Determine the value of $L$ (nH) and $C$ (pF) at 5 GHz. You must use the Smith chart to do this matching problem. Show your work on the Smith chart and present the Smith chart with your solution.

b) A transmission line is 1 m long with a loss of 3 dB/m, and is connected to load $Z_L=20-j50 \, \Omega$. Determine $\Gamma$ and the VSWR at the load and at the input of the transmission line. For $V_{o+}=1 \, \text{Vrms}$ at the load, determine the power dissipated in the load and the power dissipated in the line. Also determine $P+$ and $P-$ at the input of the transmission line.