7. At point $\text{A}$, the source termination gives $1V\text{rms}$ at coax input.

At point $\text{B}$, $V_B = V_A e^{-\alpha \frac{L}{m}}$; where $\alpha$ is in $\text{Np/m}$, length $L$.

Given $\alpha = 0.1 \text{dB} = 0.1 \frac{\text{Np}}{\text{m}}$, $0.115 \frac{\text{Np}}{\text{m}} \approx \frac{10 \text{Np}}{\text{m}}$, so

$$V_B = V_A e^{-0.115 \frac{\text{Np}}{\text{m}} \times 50 \text{m}}$$

$$V_B = 0.5627 \text{Vrms}$$

At point $\text{C}$, the signal has been amplified by $6 \text{dB}$ voltage gain. This is equal to:

$$6 \text{dB} = 20 \log_{10} \left( \frac{V_{\text{out}}}{0.5627} \right) \text{ or }$$

$$1.995 = \frac{V_o}{0.5627} \text{; } V_o = 1.123 \text{Vrms} \text{; } V_c = 1.123 \text{Vrms}$$

At point $\text{C}$, power is $\frac{V^2}{R}$ or $\frac{(1.123)^2}{75} = 16.8 \text{mW}$

In $\text{dBm}$: $\text{dBm} = 10 \log_{10} \left( \frac{16.8 \text{mW}}{1 \text{mW}} \right) = 12.25 \text{dBm}$

From $\text{A}$ to $\text{C}$: gain (dB) = $20 \log_{10} \left( \frac{V_o}{V_{\text{in}}} \right) = 20 \log \left( \frac{1.123 \text{Vrms}}{1.0 \text{Vrms}} \right)$

$$= 1.008 \text{dB}$$