Solution of Homework # 1

1. ISM band: $f_c = 915$ MHz, $B = 26$ MHz.

2. The received power is $10 \log_{10}(P_R) = -70$ dBm. Therefore:

$$P_R = 10^{-70/10} \text{ mW} = 10^{-7} \text{ mW}.$$

   The rms voltage across the input port is obtained as follows:

$$P_R = \frac{A_{\text{rms}}^2}{50} = 10^{-10} \text{ W} \longrightarrow A_{\text{rms}} = \sqrt{50 \times 10^{-10}} = 70.71 \ \mu\text{V}.$$

   It follows that the peak-to-peak voltage is

$$A_{pp} = 2\,A = 2\left(\sqrt{2}A_{\text{rms}}\right) = 200 \ \mu\text{V},$$

   where A is the amplitude of the received sinusoidal signal.

3. Input-output power characteristic of the ADL7003 low-noise amplifier: