a. 

\[
F_{\text{total}} = F_1 + \frac{F_2 - 1}{G_1} = 2 \left( \frac{4}{1} \right) = 10
\]

so 10 dB is noise figure.

b. 

\[
\text{IP}^3_{\text{total}} = \text{IP}^3_A + G_{\text{a}} \text{IP}^3_B
\]

\[
\text{IP}^3_{\text{total}} = 10\left( \frac{1}{2 \text{mW}} \right) \rightarrow \text{IP}^3_{\text{total}} = 20 \text{mW}
\]

or 13 dBm

c. 

\[
\text{SFDR} = \frac{2}{3} \left( \text{IP}^3 - \text{MDS}_m \right)
\]

\[
\text{IP}^3 = 15 \text{dBm} \quad \text{MDS}_m = -174 + 10 = -164 \text{dBm}
\]

\[
\text{SFDR} = \frac{2}{3} (118) = 79 \text{dB}
\]

\[
\text{SFDR} = \frac{2}{3} \left( \text{IP}^3 - 3 \text{dB} \left( \text{MDS}_m + 3 \text{dB} \right) \right) = \text{SFDR} \quad \text{The SFDR doesn’t change.}
\]

d. IM3 tones at 900 MHz and at 1.2 GHz.

IM2 tones would occur at 100 MHz and 2.1 GHz but should not appear since IIP2 is infinity

e. The filter knocks the power of the IM3 at 900 MHz down by 10 dB (20 dB in voltage).

f. The IIP3 has been improved by 20 dB since the IM3 tone is reduced by 20 dB. The filter is assumed to have a negligible impact on the noise. Therefore, the SFDR has improved by 12 dB to 130 dB