a) \[ H_s(s) = \frac{1}{\text{R} + \text{Cs}} = \frac{1}{\text{RC} + 1} \]

\[ = \frac{\frac{1}{\text{C}}}{j\omega \text{R} + \frac{1}{\text{C}}} \]

\[ \therefore \text{LET} \quad \frac{1}{\text{RC}} = \alpha \]

\[ H_s(s) \] found by taking voltage across the resistor. Filters complementary because of KVL.

b)

\[ \hat{w}_s(t) + \hat{w}_n(t) = \hat{w}(t) \]

Signal-to-noise ratio for \( \hat{w}_s(t) \) is

\[ \frac{\sigma_s^2 \text{A}^2 \text{SNR}(\hat{w}_s)}{4} \]

Signal power in \( \hat{w}(t) \) = \( \frac{\sigma_n^2 \text{A}^2 \text{SNR}(\hat{w}_n)}{4} \)

Noise power is the sum: \( \text{SNR} \).

\[ S = \frac{\sigma_s^2 \text{A}^2 \text{SNR}(\hat{w}_s)}{4\text{SNR}} \]

This SNR half that of straightforward AM.