Problem. Assuming fixed point arithmetic, compute the total variance σ_f^2 of roundoff errors at the output of the digital filter

$$H(z) = \frac{z^2}{z^2 - \frac{3}{4}z + \frac{1}{8}}$$

when it is realized in Direct I, Cascade and parallel forms. Assume that all noise sources are white, zero mean with unit variance uniformly distributed random signals. Also, assume that roundoff errors from quantization of coefficients are negligible compared to the quantization of the results of multiplication....