1. An LTI filter is described by
   \[ y[n] = x[n] - x[n-2] \]

   Determine the frequency response, \( \mathcal{H}(\hat{\omega}) \).

   \[
   \mathcal{H}(\hat{\omega}) = \sum_{k=0}^{M} b_k \exp^{-j\hat{\omega}k} \\
   = 1 - \exp^{-2j\hat{\omega}} \\
   = 2 \exp^{j(\pi/2 - \hat{\omega})} \sin \hat{\omega}
   \]

2. If the input is \( x[n] = 2 + \cos(0.25\pi n + \pi/4) \), find \( y[n] \).

   \[
   y[n] = \mathcal{H}(\hat{\omega})x[n] \\
   = 2\mathcal{H}(\hat{\omega} = 0) + |\mathcal{H}(\hat{\omega} = \pi/4)| \cos(\pi n/4 + \pi/4 + \angle\mathcal{H}(\hat{\omega} = \pi/4)) \\
   = 0 + 2 \sin(\pi/4) \cos(\pi n/4 + \pi/2) \\
   = \frac{2}{\sqrt{2}} \cos(\pi n/4 + \pi/2)
   \]