PROBLEM:

We have shown that an LTI system can be represented in several equivalent ways. In each part below, you are given one representation of an LTI system and you are to provide the other representations requested. (Frequency response formulas can be given in any convenient form. You do **NOT** have to simplify them.)

(a) Frequency response:

Impulse response:

Difference equation: $y[n] = x[n] + 2x[n-1] + x[n-2]$

(b) Frequency response: $\mathcal{H}(\hat{\omega}) = e^{-j\hat{\omega}}(2\cos(\hat{\omega}))$

Impulse response:

Difference equation:

(c) Frequency response:

Impulse response:

MATLAB Implementation: $y = \texttt{conv([0,1,0,-1],x)}$