1. A right-sided sequence $x[n]$ has z-transform

$$X(z) = \frac{3z^{-10} + z^{-7} - 5z^{-2} + 4z^{-1} + 1}{z^{-10} - 5z^{-7} + z^{-3}}$$

Determine $x[n]$ for $n<0$.

2. Suppose the following facts are given about the signal $x(t)$ with the Laplace transform $X(s)$
   1) $x(t)$ is real and even.
   2) $X(s)$ has four poles and no zeros in the finite s-plane.
   3) $X(s)$ has a pole at $s = (\frac{1}{2})e^{j\pi/4}$.
   4) $\int_{-\infty}^{\infty} x(t) \, dt = 4$.

Determine $X(s)$.

3. Let $x[n]$ be a real and odd periodic signal with period $N=7$ and Fourier coefficients $a_k$. Given that $a_{15} = j$, $a_{16} = 2j$, $a_{17} = 3j$,

Determine the values of $a_0$, $a_{-1}$, $a_{-2}$, $a_{-3}$.

4. Let $x[n]$ and $h[n]$ be signals with the following Fourier transforms:

$$X(j\omega) = 3e^{j\omega} + 1 - e^{-j\omega} + 2e^{-3j\omega}$$
$$H(j\omega) = -e^{j\omega} + 2e^{-2j\omega} + e^{j4\omega}$$

Determine $y[n] = x[n] * h[n]$. 