Answer Key to HW 6

1a)

$$y[n] = \left(\frac{(-2)^{n+1} - (e^{-1})^{n+1}}{-2 - e^{-1}} \right) u[n].$$

1b)

$$y[n] = \frac{1}{2} \left(e^{-n} + \frac{(-2)^{n+1} - (e^{-1})^{n+1}}{2 + e^{-1}} \right) u[n]$$

1c)

$$y[n] = \frac{18}{25} \left((\frac{1}{3})^n + 5n(2)^n - (2)^n \right) u[n].$$

1d)

$$y[n] = 0.38 \left[3^{n+1} \cos[\frac{\pi}{3}(n+1) - 2.26] \right] + 0.64\,(2)^{n+1} \Big] u[n]$$

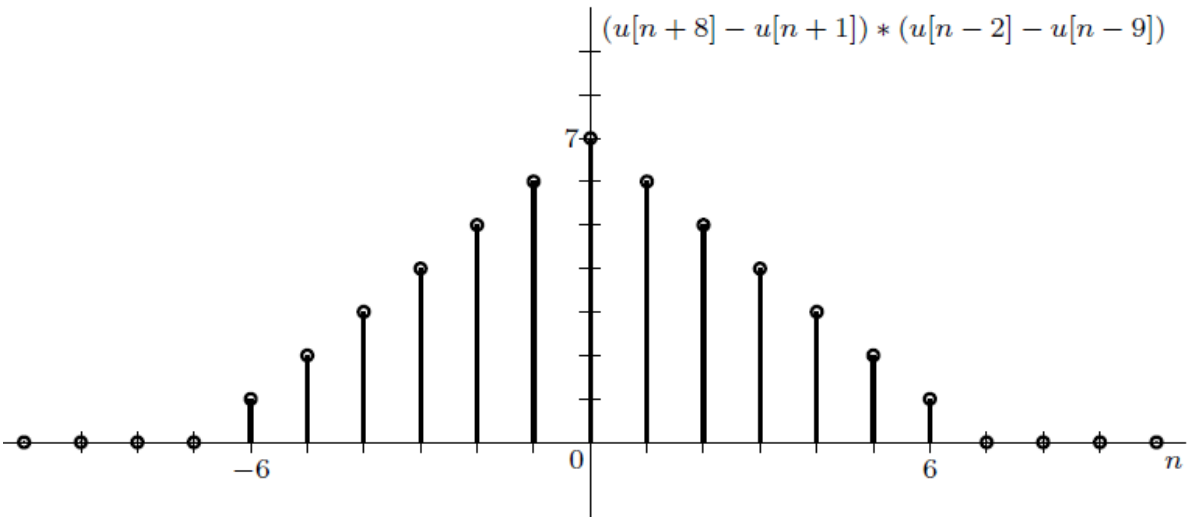
2a)

$$h_{\mathrm{p}}[n] = 2u[n] + (0.5)^n u[n] - u[n-5].$$

2b)

$$h_{\mathrm{c}}[n] = (n + 3 - 2(0.5)^{n+1})u[n] - (n - 2 - 2(0.5)^{n-4})u[n-5].$$

3)



4a)

$$H_{\mathrm{a}}(z) = \frac{2z^2 - z + 3}{z^2 - 2z + 1}.$$

4b)

$$H_{\mathrm{b}}(z) = \frac{z - 3}{z^2 + 0.5z - 0.8}$$

5a)

$$H_{\mathrm{a}}(z) = 1 + 4z^{-2} - 2z^{-4}.$$

5b)

$$H_{\mathrm{b}}(z) = \frac{z}{z - \gamma}.$$

6)

(a) the system is both asymptotically and BIBO stable.

(b) the system is marginally stable and BIBO unstable.

(c) the system is both asymptotically and BIBO unstable.

(d) the system is both asymptotically and BIBO unstable.

(e) the system is marginally stable and BIBO unstable.

7)

Time constant, rise time, and pulse dispersion are all the same value $W_h = 3$. An input containing $(0.5)^n$ will cause system resonance.