1. Given the system and signals shown in Figure 1, provide a labeled plot of $W(j2\pi f)$ and $R(j2\pi f)$ for the following cases of $y(t)$:

(a) $y(t) = \cos(2\pi(1.5 \text{ kHz})t)$,

(b) $y(t) = 2\sin(2\pi(1.5 \text{ kHz})t)$,

(c) $y(t) = \sin(2\pi(1.6 \text{ kHz})t)$.

![Figure 1: Demodulating receiver and associated signals.](image)

2. Given the filter frequency response shown in Figure 2, calculate $y(t)$ for the following cases of $x(t)$:

(a) $x(t) = \cos(2\pi(900 \text{ kHz})t) + 3\cos(2\pi(2 \text{ MHz})t) + 5\cos(2\pi(3.1 \text{ MHz})t)$,

(b) $x(t) = 2\cos(2\pi(200 \text{ kHz})t) + 4\sin(2\pi(2 \text{ MHz})t)$.

![Figure 2: Continuous-time filter and associated signals.](image)
3. Given the discrete-time filters shown in Figure 3:

(a) What is the order of filters \( H(e^{j2\pi \lambda}) \) and \( W(e^{j2\pi \lambda}) \)?

(b) Calculate and plot \( H(e^{j2\pi \lambda}) \)

(c) Calculate \( W(e^{j2\pi \lambda}) \) in terms of \( H(e^{j2\pi \lambda}) \). Hint: use the shift property of the DTFT to do this.

(d) Given your results from the previous question, how does the magnitude of the frequency response \( W(e^{j2\pi \lambda}) \) compare to the magnitude of the frequency response \( H(e^{j2\pi \lambda}) \)?

Figure 3: Discrete-time FIR filters with different \( b \) coefficients.