1. Sketch the amplitude spectrum (amplitude vs. frequency) for each of the following signals:
   (a) $y(t) = 3\cos(360^\circ * 5k * t) + 5\cos(360^\circ * 2k * t) + 2\cos(360^\circ * 8k * t) - 7\cos(360^\circ * 4k * t)$

   (b) $y(t) = 3\cos(360^\circ * 5k * t + 30^\circ) + 5\cos(360^\circ * 2k * t - 45^\circ) + 2\cos(360^\circ * 8k * t) - 7\cos(360^\circ * 4k * t + 150^\circ)$

2. Plot the output spectrum when the given signal is applied to the input of each of the following filters:

$$\begin{aligned} V_{in}(t) = 6V &+ 5V\cos(360^\circ * 200k * t) + 7V\cos(360^\circ * 350k * t) + 4V\cos(360^\circ * 550k * t) \\ &+ 3V\cos(360^\circ * 700k * t) + 9V\cos(360^\circ * 850k * t) \end{aligned}$$

(a) An ideal low-pass filter with a cutoff frequency of 400kHz.

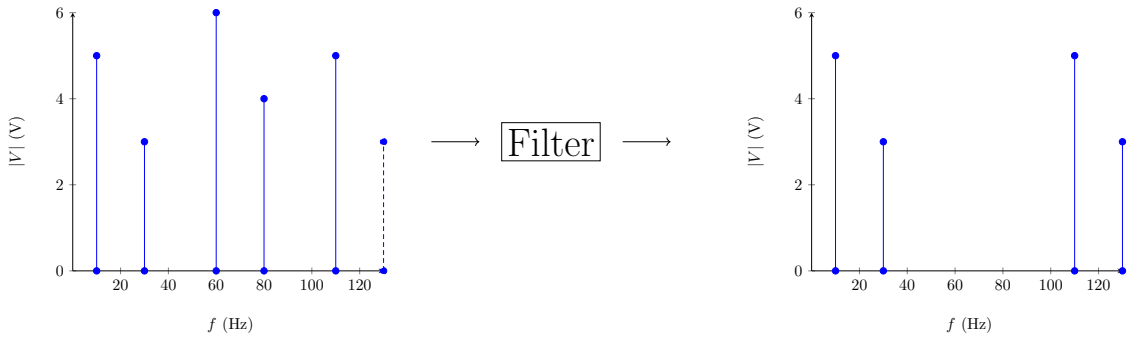
(b) An ideal band-reject filter with cutoff frequencies of 300kHz and 600kHz.

(c) An ideal band-pass filter with cutoff frequencies of 400kHz and 750kHz.

(d) An ideal high-pass filter with a cutoff frequency of 500kHz.

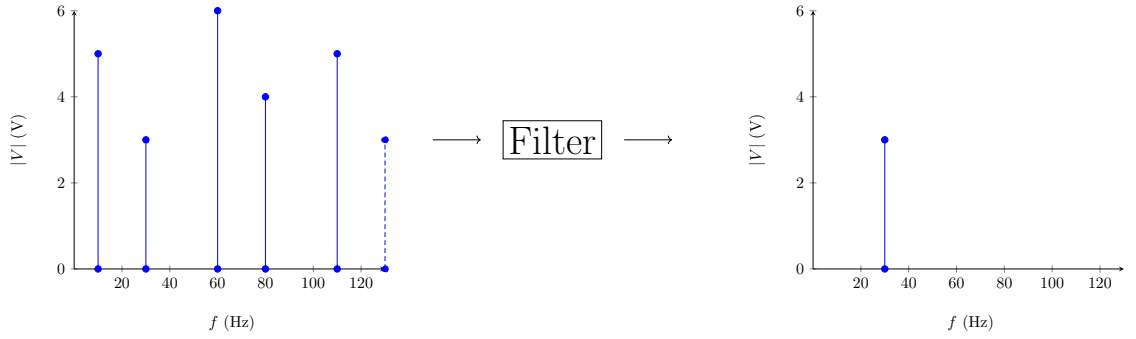
3. Given the following input and output amplitude spectra, determine the type of ideal filter and propose representative cutoff frequency/frequencies.

(a)



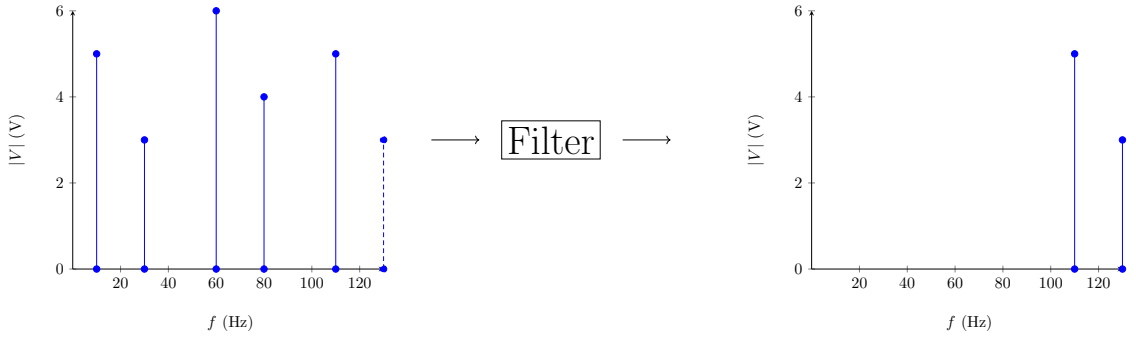
Filter type = Cutoff frequency(ies) =

(b)



Filter type = Cutoff frequency(ies) =

(c)



Filter type = Cutoff frequency(ies) =