

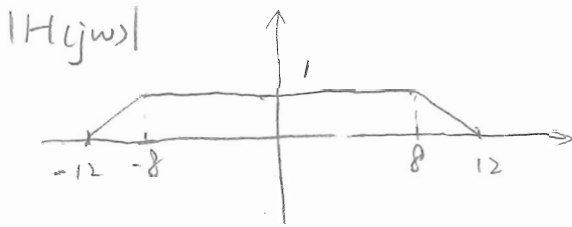
Problem 2 (c). Consider an LTI system with impulse response

$$h(t) = \frac{\pi}{2} \frac{\sin(2t)}{\pi t} \frac{\sin(10t)}{\pi t} \quad (1)$$

Determine the output  $y(t)$  for the input  $x(t)$  given below, which is the Fourier Series expansion for a periodic sawtooth waveform with period  $T = \pi$ .

$$x(t) = \sum_{k=-\infty}^{-1} \frac{j(-1)^k}{k\pi} e^{jk2t} + \sum_{k=1}^{\infty} \frac{j(-1)^k}{k\pi} e^{jk2t}$$

Show work and write your expression for  $y(t)$  in the space directly below.



Only when  $2|k| < 12$ .

$$\Rightarrow |k| < 6, \quad y(t) \neq 0$$

Excellent

$$y(t) = \frac{1}{2} \frac{j}{5\pi} e^{-10jt} + \sum_{k=4}^{-1} \frac{j(-1)^k}{k\pi} e^{jk2t} + \sum_{k=1}^4 \frac{j(-1)^k}{k\pi} e^{jk2t} - \frac{1}{2} \frac{j}{5\pi} e^{10jt}$$