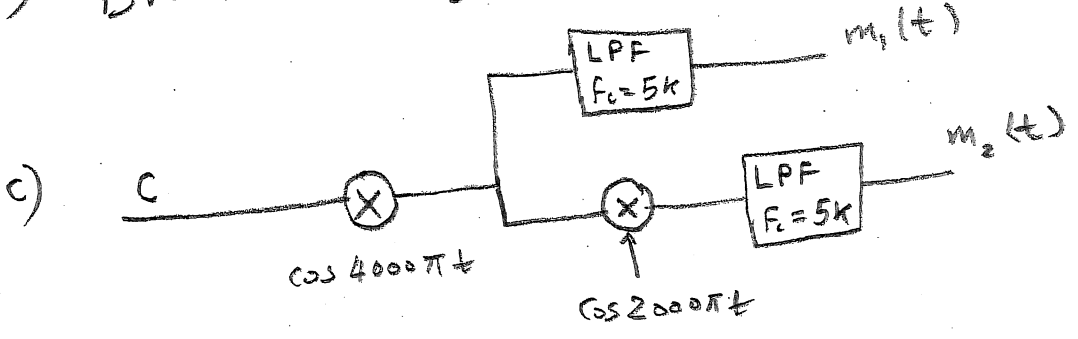
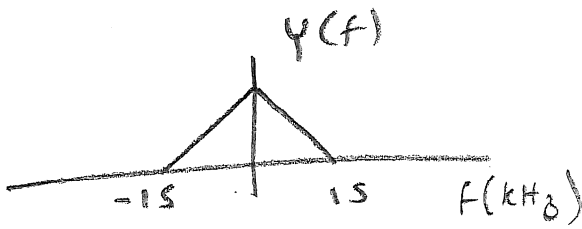


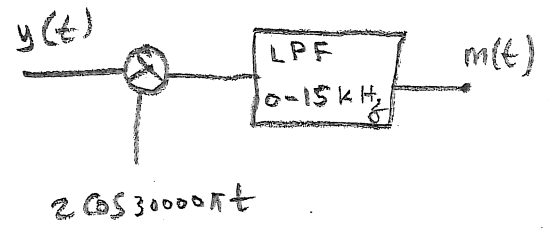
b) $BW \geq 35 \text{ kHz} - 5 \text{ kHz} \geq 30 \text{ kHz}$



Q4) a)

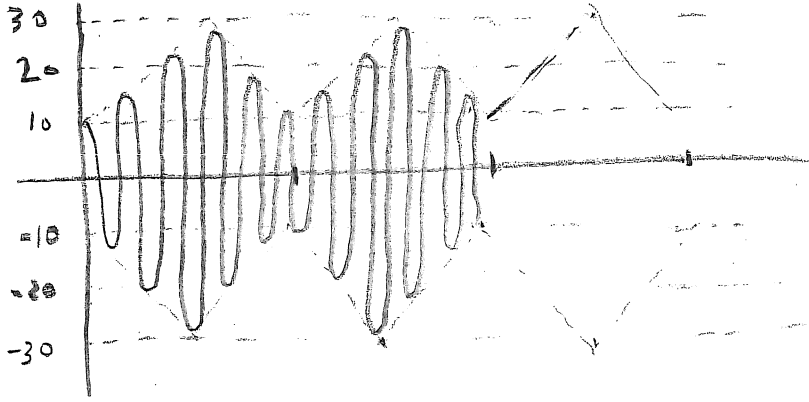


b)

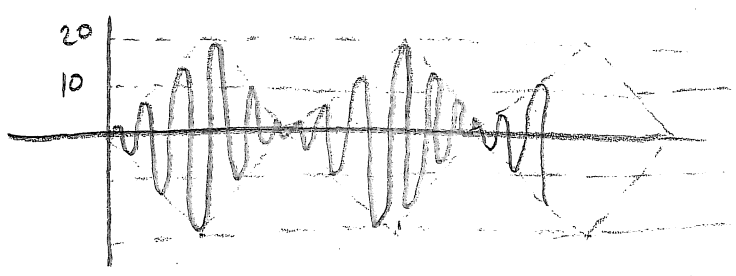


(2)

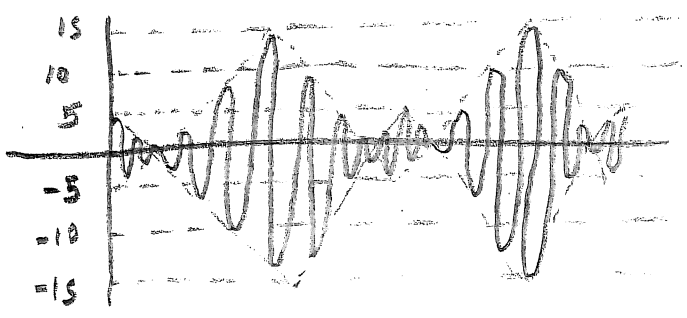
Q5) a) i) $\mu = 0.5 \Rightarrow \mu = \frac{m(t)_{\max}}{\text{DC offset}} = \frac{A}{B} = 0.5 \rightarrow B = 2A = 20$



ii) $\mu = 1 \Rightarrow \frac{A}{B} = 1 \Rightarrow B = A = 10$



iii) $\mu = 2 \Rightarrow \frac{A}{B} = 2 \Rightarrow B = \frac{A}{2} = 5$



iii) $\mu = \infty \Rightarrow \frac{A}{B} = \infty \Rightarrow B = 0$

DSB-SC
 $m(t) \cos \omega_c t$

Q5) continue for $m=2 \Rightarrow B=5$

$$\phi_{Am}(t) = [B + m(t)] \cos \omega_c t = 5 \cos \omega_c t + m(t) \cos \omega_c t$$

b) Amplitude of carrier = $B = 5$

$$P_c = \frac{1}{2} B^2 = \frac{1}{2} (25) = 12.5$$

c) sideband Power $\frac{\overline{m^2(t)}}{2} = 16.67$

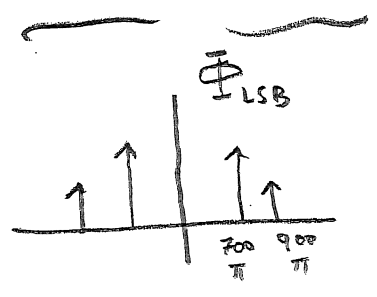
Note $\overline{m^2(t)} = \frac{1}{T_0/4} \int_0^{T_0/4} \left(\frac{40t}{T_0}\right)^2 dt$

$$\eta = 57.14\%$$

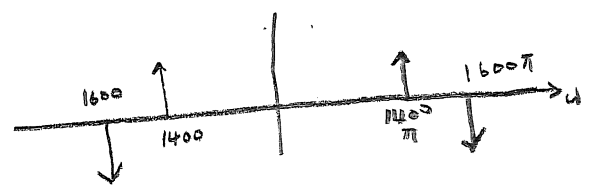
Q6) at point c $w(t) = \frac{A^2}{2} \left[1 + \frac{2m(t)}{A} + \left(\frac{m(t)}{A}\right)^2 \right]$

distortion $\frac{\overline{m^2(t)}}{2}$

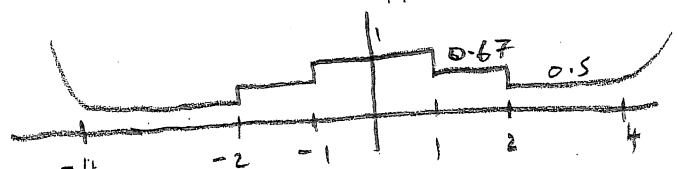
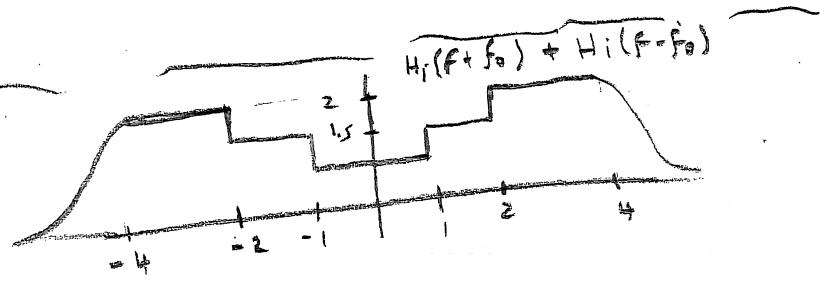
Q7) a) $\phi_{LSB}(t) = 2 \cos(700\pi t) + \cos(900\pi t)$



b) $\phi_{USB}(t) = \frac{1}{2} [\cos(1400\pi t) - \cos(1600\pi t)]$

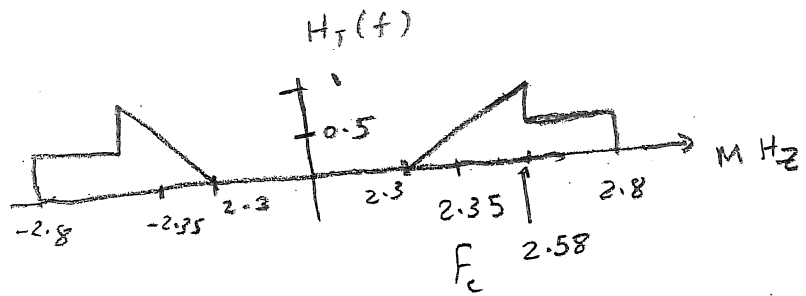


8) $H_o(f) = \frac{1}{H_i(f+f_o) + H_i(f-f_o)}$



Q8) Possible Filter

$$H_p(f) = H_T(f)$$



4

