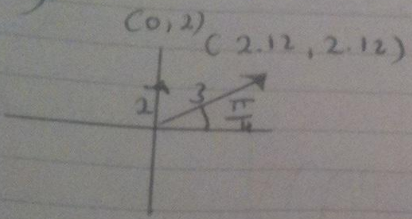
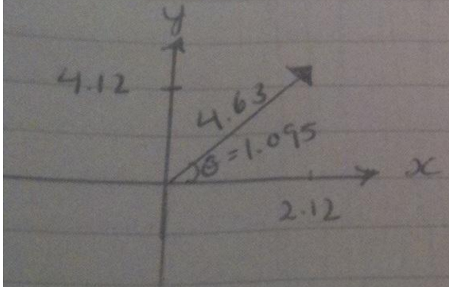
L5)

1)



$$v(t) = 3\cos\left(200\pi t + \frac{\pi}{4}\right) + -2\cos\left(200\pi t - \frac{\pi}{2}\right)$$



$$v(t) = 4.63\cos(200\pi t + 1.095)$$

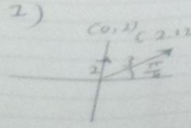
$$v(t) = 2.12\cos(200\pi t) - 4.12\sin(200\pi t)$$

$M = 8$, $\log_2(8) = 3$, so 3 bits.

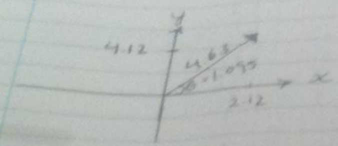
ASK ← only amplitude change.

L5)

2)



$v(t) = 3\cos(200\pi t + \frac{\pi}{4}) +$
$-2\cos(200\pi t - \frac{\pi}{2})$

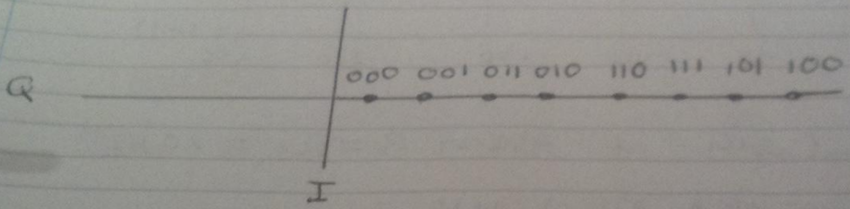


$V(t) = 4.63\cos(200\pi t + 1.095)$

3) $v(t) = 2.12\cos(200\pi t) - 4.12\sin(200\pi t)$

4) $m = 8$. $\log_2(8) = 3$, so 3 bits.

ASK ← only amplitude change



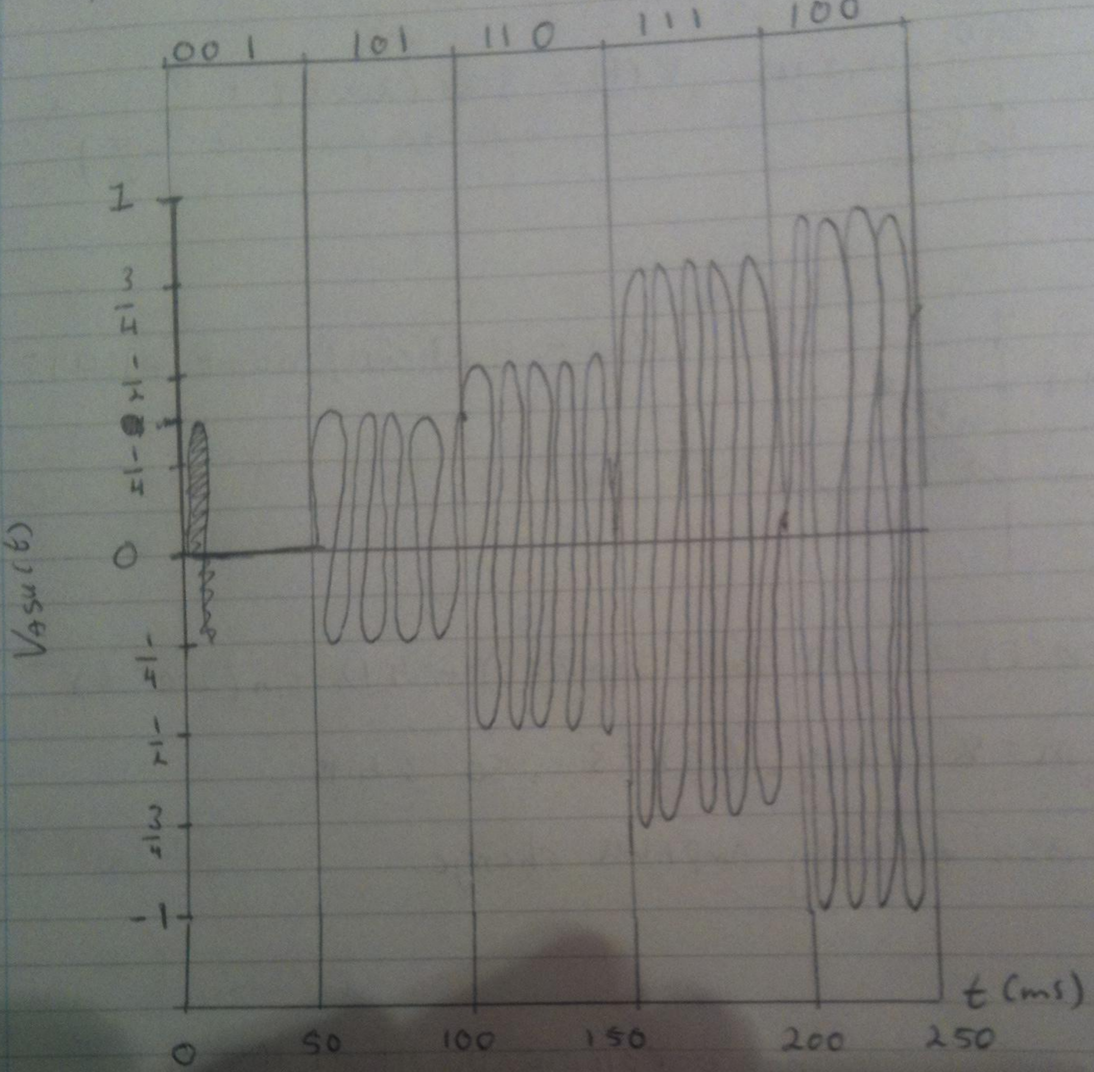
5) $T_s = \frac{1}{20} = 50ms^{-1}$, $f_c = 100\,Hz$

001 → 0, 101 → $\frac{1}{4}$, 110 → $\frac{1}{2}$, 111 → $\frac{3}{4}$

100 → 1

⟶

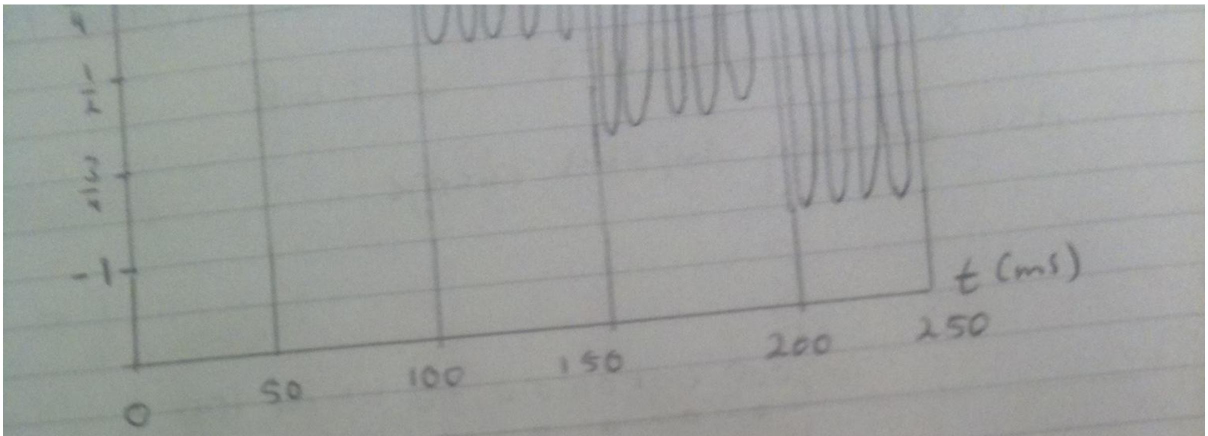
5) Continued..



6) Bandwidth at ~~ASK~~ $B = R_s = 20\,Hz$

~~$R_B = kR_s = \log_2(M)R_s =$~~

~~$R_B = R_s$ ~~



6) Bandwidth at ~~ASK~~ $B = R_s = 20\ Hz$

~~[illegible]~~

~~[illegible]~~

7) $$B = \frac{R_s(M+1)}{2} = \frac{20(8+1)}{2} = 90\ Hz.$$

* Hence ASK is more bandwidth efficient than FSK.