

1) BPSK = PSK $\rightarrow T_b = 10 \text{ ms}$
QAM $\rightarrow T_b = 5 \text{ ms}$

\Rightarrow PSK $\rightarrow T_b = 10 \text{ ms} = 0.01 \text{ s}$
QAM $\rightarrow T_b = 5 \text{ ms} = 0.005 \text{ seg}$

Para calcular la capacidad

$$V_T = \frac{1}{T} = \frac{1}{0.01 \text{ seg}} = 100 \text{ símbolos ps (bandas)}$$

Asumo que como es QAM, hay 4 puntos de constelación

$$\Rightarrow 4 = 2^n \Rightarrow \log_2(4) = n \Rightarrow \underline{\underline{2}}_{4.75!}$$

$$\Rightarrow V_T = \frac{2}{0.005 \text{ seg}} = 400 \text{ bps}$$

\therefore Es mejor QAM!

lo del canal ruidoso, no! no!

2) - a) - 1000 bauds, ASK per simbolo
 40 ser que ASK tiene un bit por representante
 2 símbolos

$$V_m = 1000 \frac{\text{simb}}{\text{seg}} \cdot 1 \frac{\text{bit}}{\text{simb}} = 1000 \text{ bps}$$

o-

(bps) $V = \text{Tasa bauds} \times \lg_2(V)$
 Lp rs 2'

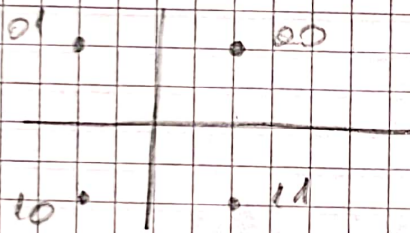
=> tiene 2 puntos! de 0 y 1

b) - 1500 bauds, BPSK = PSK

$$V_m = 1500 \frac{\text{simb}}{\text{seg}} \times 1 \frac{\text{bit}}{\text{simb}} = 1500 \text{ bps}$$

c) - 2000 bauds, QPSK

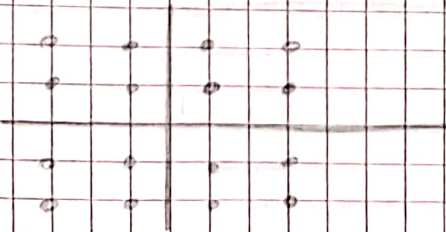
$$V_m = 2000 \frac{\text{simb}}{\text{seg}} \cdot 2 \frac{\text{bit}}{\text{simb}} = 4 \text{ Kbps}$$



d) - 3000 bauds, 16-QAM

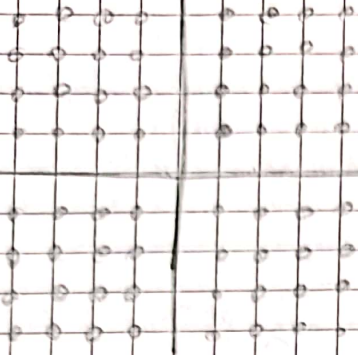
Lp $16 = 2^4 \Rightarrow \lg_2(16) = 4$

$$\Rightarrow V_m = 3000 \frac{\text{simb}}{\text{seg}} \cdot 4 \frac{\text{bits}}{\text{simb}} = 12 \text{ Kbps}$$



e) 3000 Symbols, 64 - QAM
 $64 = 2^n$
 $16 = n$

$$\Rightarrow V_m = 3000 \frac{\text{Sym}}{\text{Sec}} \cdot 6 \frac{\text{bit}}{\text{Sym}} = 18 \text{ Kbps}$$



3) Velocity?

$$V_T = X \text{ bauds} \times \text{bits}$$

$$\Rightarrow a) V_T = 4000 \text{ bps} \quad \text{ASK} \Rightarrow 1 \text{ bit/symbol}$$

$$\Rightarrow \frac{V_T}{1 \text{ bits}} = X \text{ Bauds}$$

$$\frac{4000 \text{ bps}}{1 \text{ bits}} = \text{bauds}$$

$$\boxed{4000 = \text{bauds}}$$

$$b) \text{ BPSK} \Rightarrow 1 \text{ bit/symbol}$$

$$\Rightarrow \frac{6000 \text{ bps}}{1 \text{ bit/sym}} = \boxed{6000 \text{ bauds}}$$

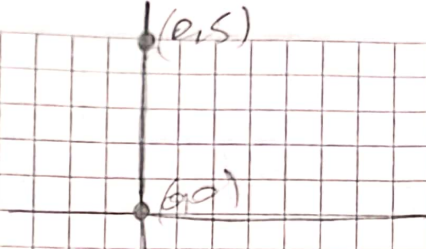
$$c) \frac{12000 \text{ bps}}{2 \text{ bit/sym}} = \boxed{6000 \text{ bauds}} \quad \text{QPSK}$$

$4 = 2^n$
 $2 = n$

$$d) \frac{36000 \text{ bps}}{6 \text{ bit/sym}} = \boxed{6000 \text{ bauds}} \quad 64 - \text{QAM}$$

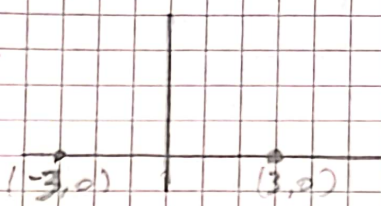
$64 = 2^n$
 $10 = n$

4) a) -



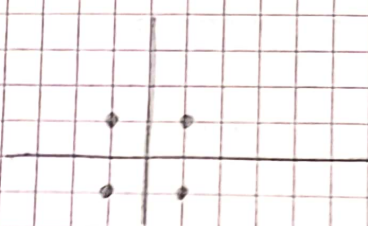
Cambia la amplitud!
 \Rightarrow ASK

b) -



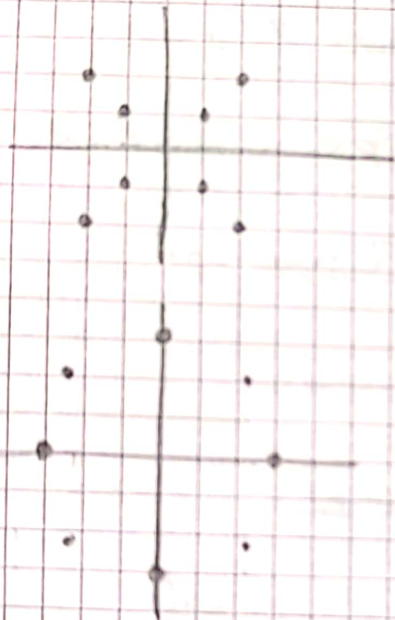
Misma amplitud
 Cambia Phase! \Rightarrow PSK

c) -



Cambia Phase
 \Rightarrow QPSK

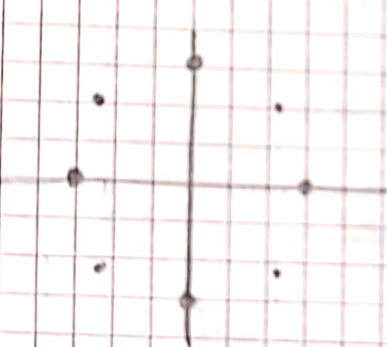
d) -



Cambia amplitud y phase

\Rightarrow 8-QAM!

e) -



\Rightarrow 8-QAM!

5) - $T_b = 1 \text{ ms} = 0,001 \text{ seg}$

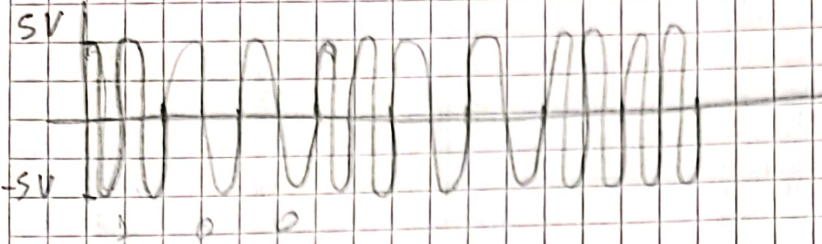
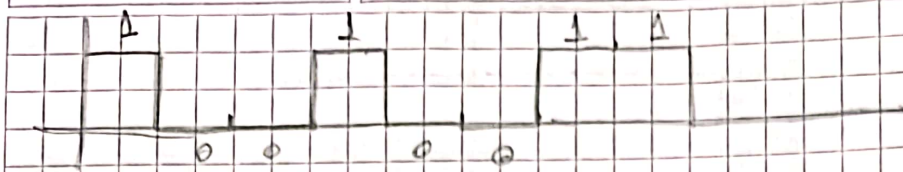
a) - En FSK ya se que:

$$V(t) = \begin{cases} V_p \sin(2\pi F_1 t) & 1b \\ V_p \sin(2\pi F_2 t) & 0b \end{cases}$$

$$F_1 = 2/T_b = 2/0,001 \text{ s}$$

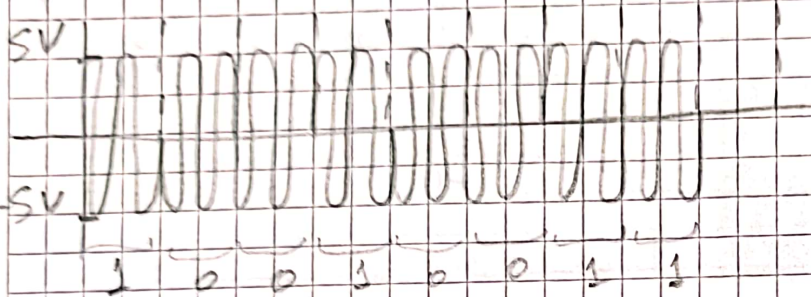
$$\Rightarrow V(t) = \begin{cases} 5V \sin(2\pi 2/T_b t) & 1b \\ 5V \sin(2\pi 1/T_b t) & 0b \end{cases}$$

NOTA

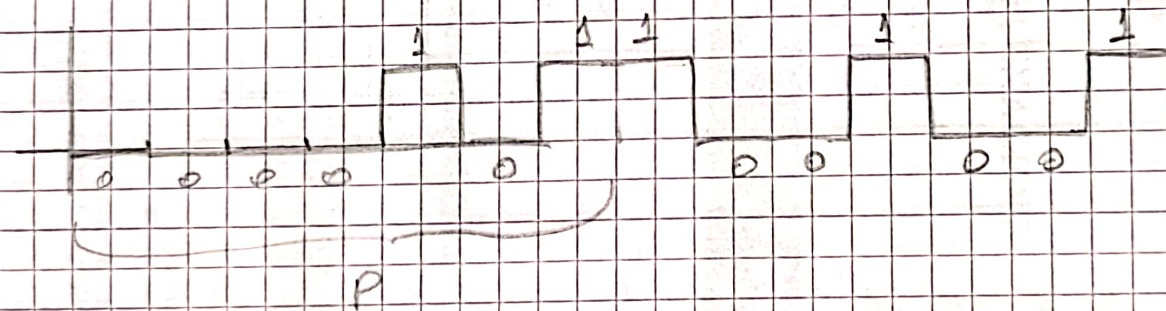


algo "3.1"

b) Ahora es BPSK

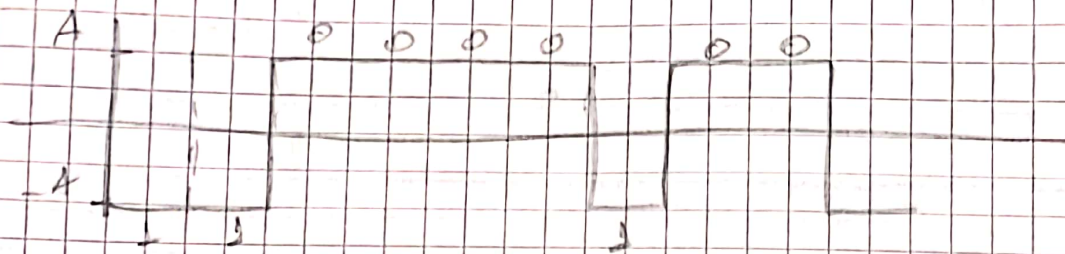


6) $P = 0000101$ $I = 1001001$
ASK!

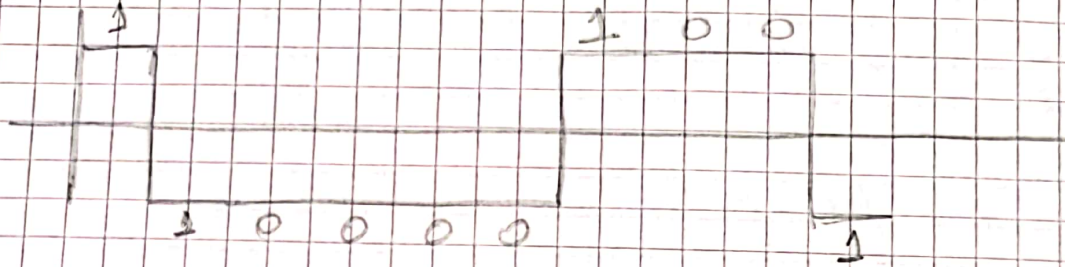


7) Con ayuda de la filmisora! hacer el trabajo!

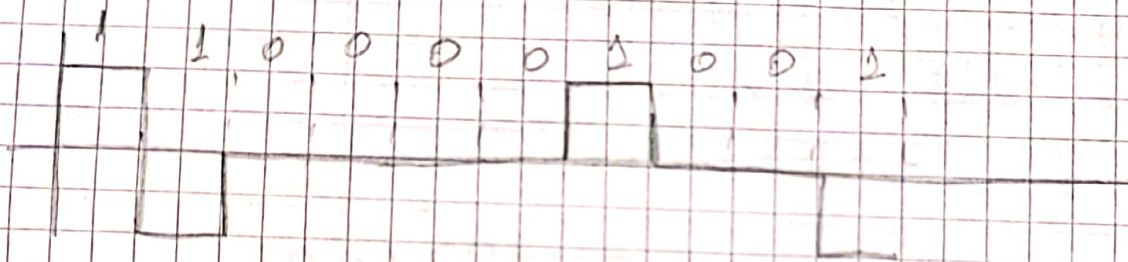
8) a) NRZ-L



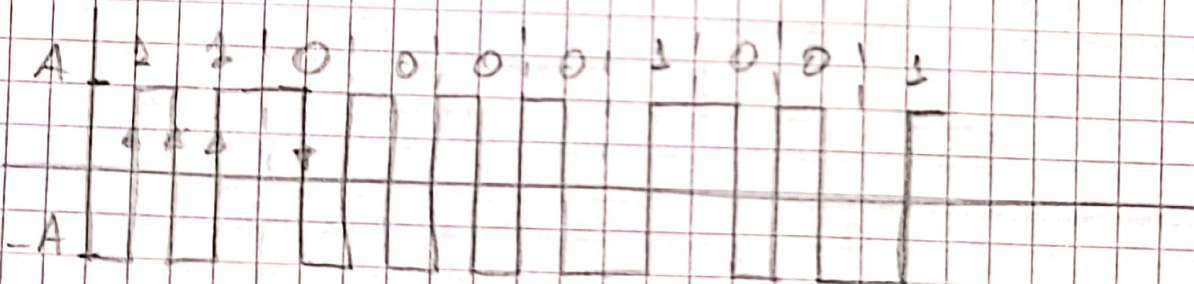
b) NRZ-I



c) AMI



d) Manchester



e) Manchester differential

