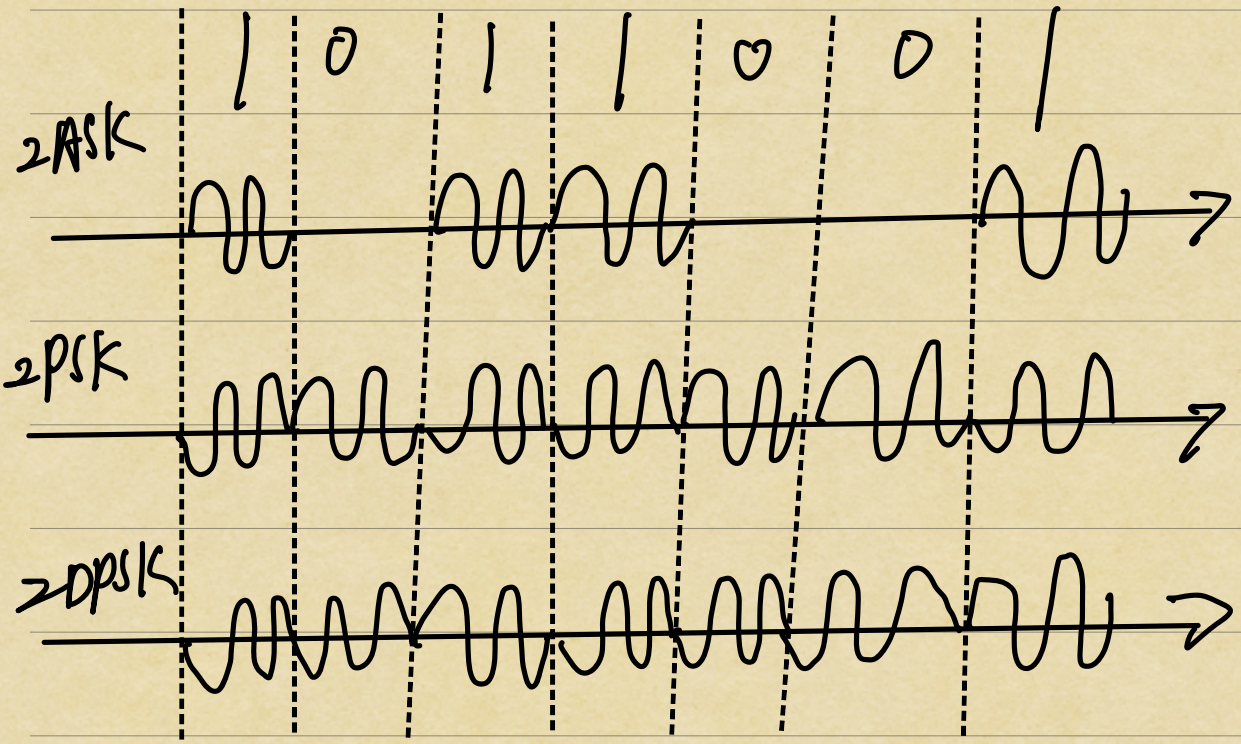
7-1

(1) $f_C = \frac{8\pi \times 10^3}{2\pi} = 4000(Hz)$

$R_B = 2000\ Baud$

2个载波周期

(2)



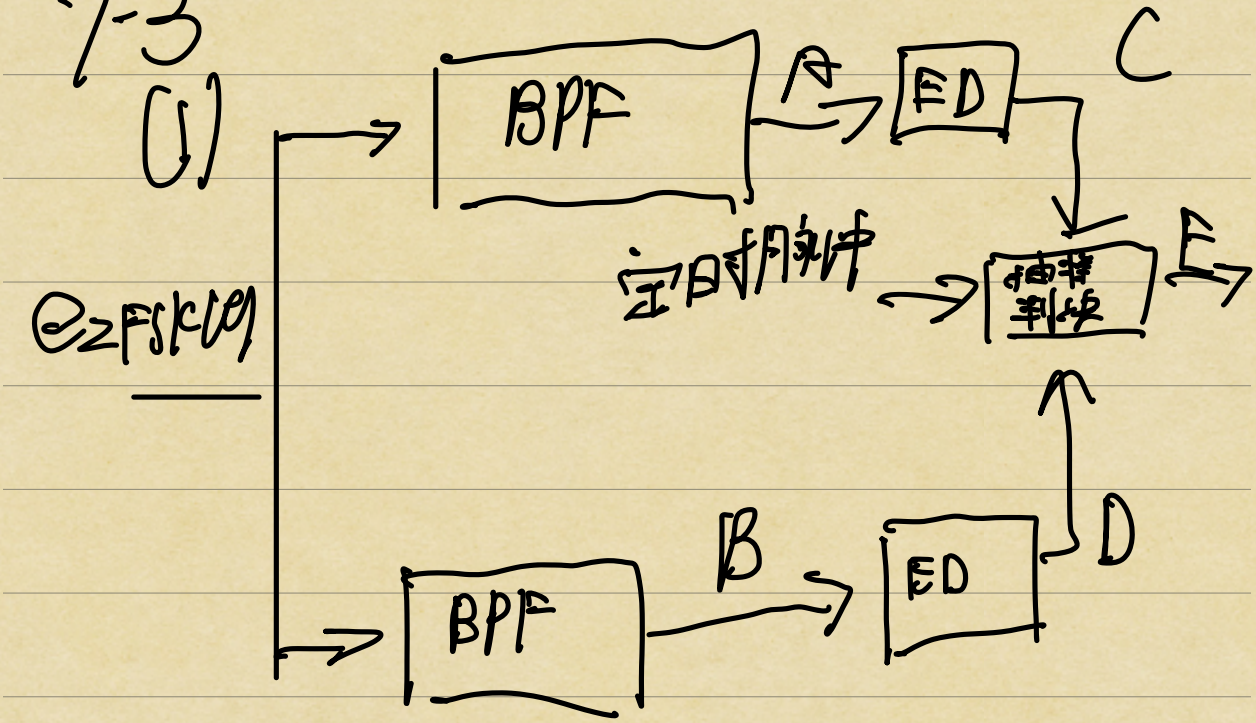
(3)

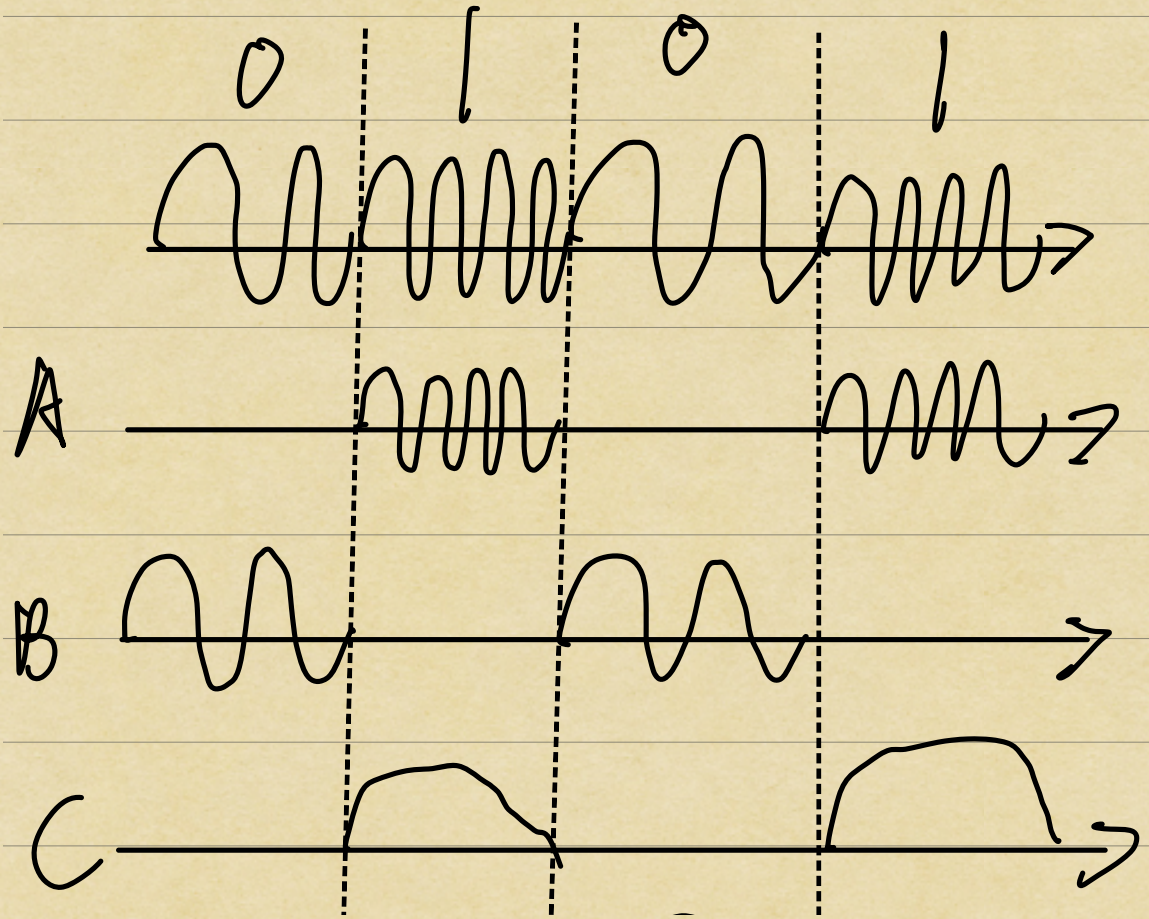
$B_{2PSK} = B_{2DPSK} = B_{2ASK} = 2f_B$

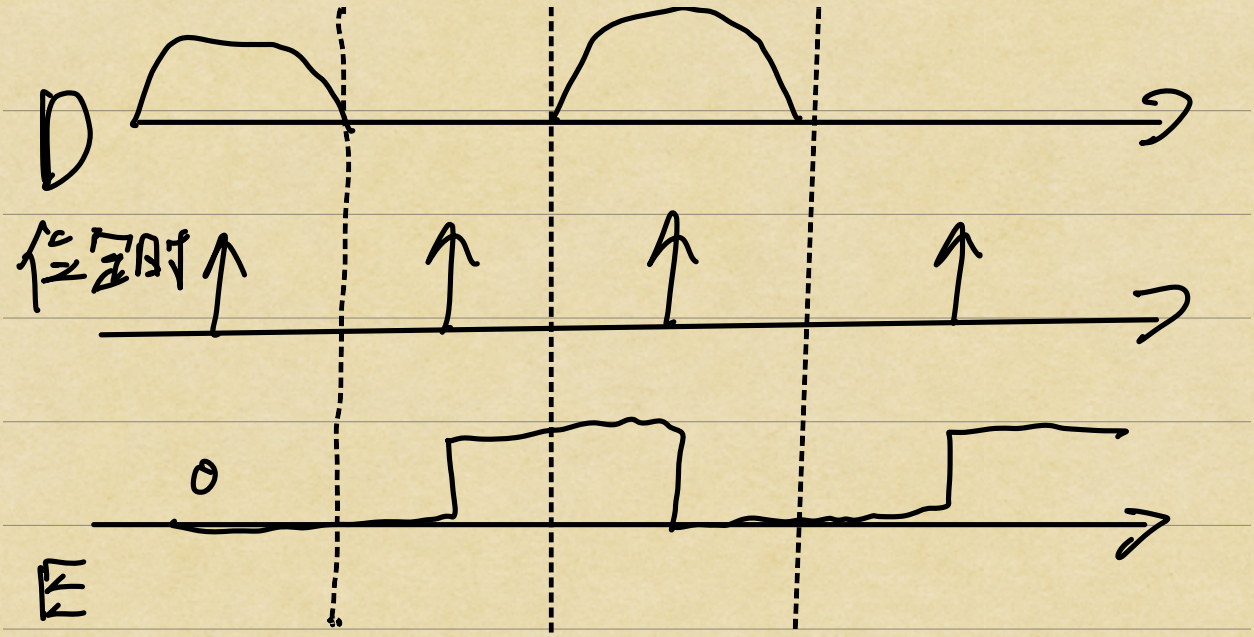
$= 4000(Hz)$

7-3

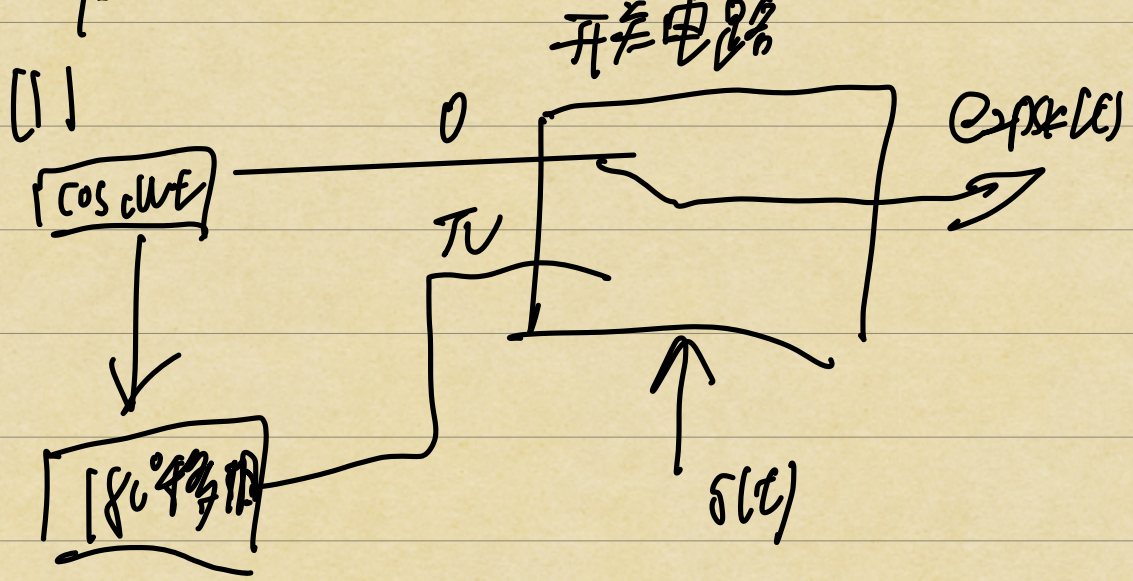
(1)

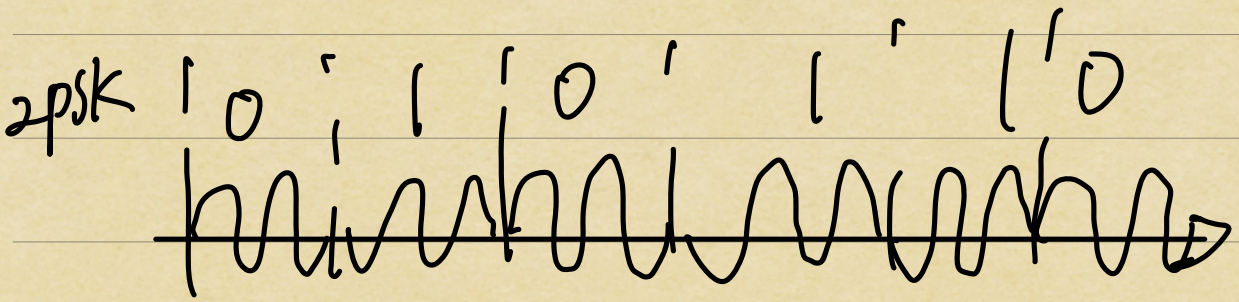




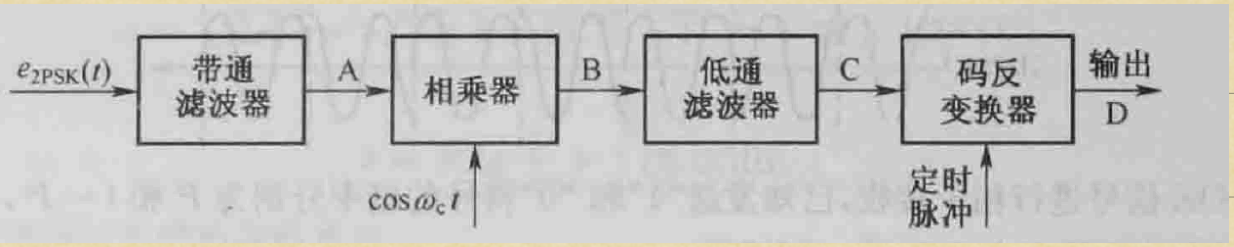


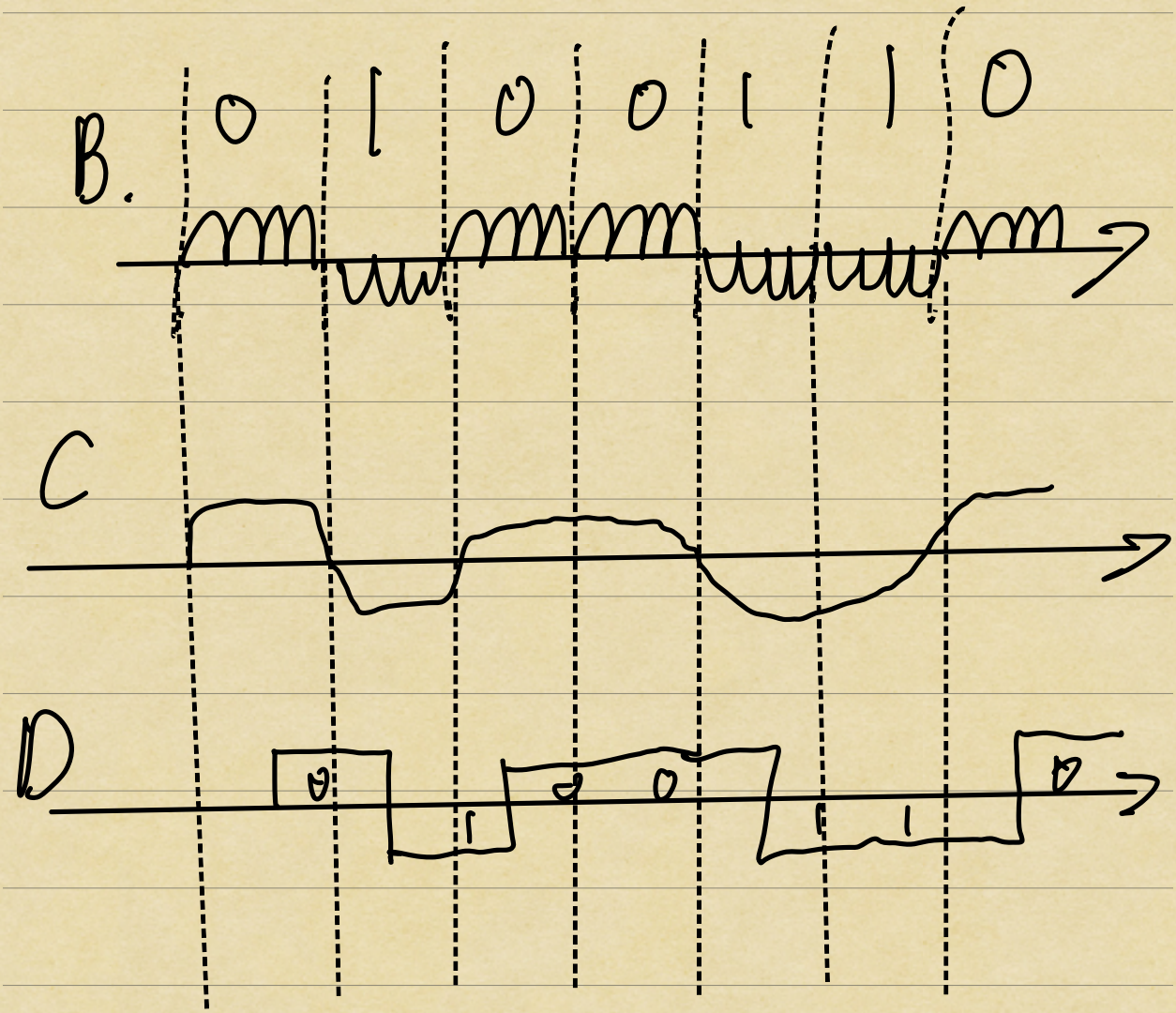
7-4.





(2)





(3) $P_{2psk}(f) = \frac{1}{4}[P_s(f+f_c)+P_s(f-f_c)]$

$\cdots = \frac{1}{4}[\cdots]^2$

$P_s(f)=4f_BP(1-P)|G(f)|^2+f_B^2\sum_{m=-\infty}^{\infty}|(2P-1)^m|$

$\delta(f-mf_B)$

$G(f)=T_B\left(\frac{\sin\pi fT_B}{\pi fT_B}\right)=T_BSa(\pi fT_B)$

m 为不等于0的整数时

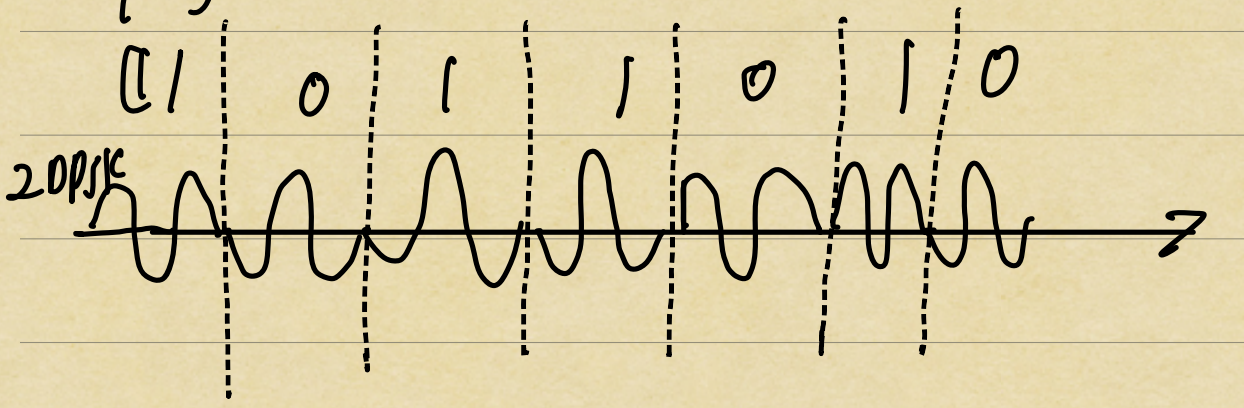
$P_s(f)=4f_BP(1-P)|G(f)|^2+f_B^2(2P-1)^2|G(0)|^2\delta(f)$

特别 $P=0.6$, $f_B=1200$ 有 $G(0)=T_B$ 代入

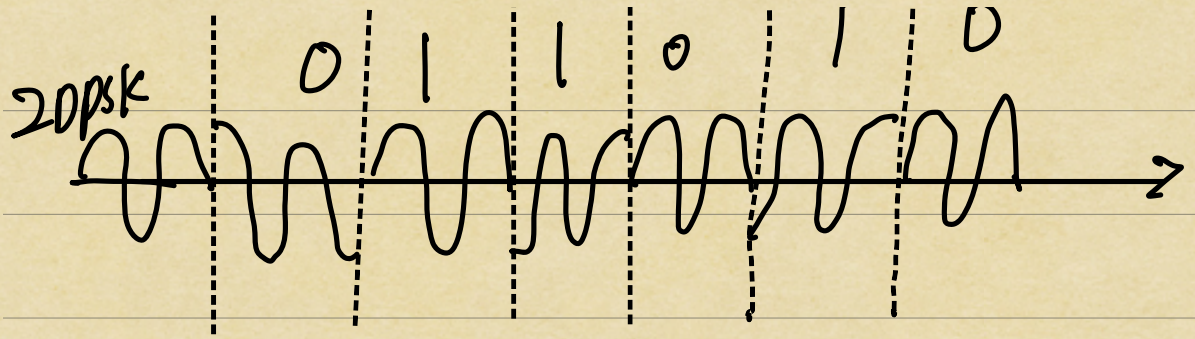
$P_{2PSK}(f)=288[1.a(f+f_c)|^2+|a(f-f_c)|^2]+$

$0.01[\delta(f+f_c)+\delta(f-f_c)]$

7-5



(2)



7-6

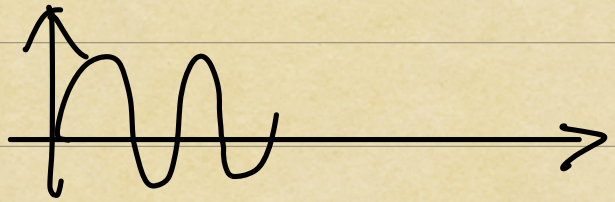
(1) 最佳判决门限 $b^*=\frac{a}{2}$

$$P_e=\frac{1}{2}\operatorname{erfc}\left[\sqrt{\frac{r}{4}}\right]\approx\frac{1}{\sqrt{\pi r}}e^{-\frac{r}{4}}=0.0146$$

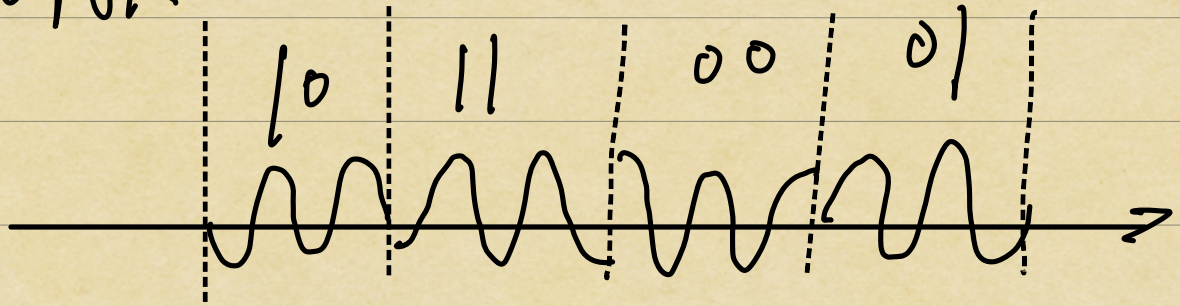
(2) $b^*=\frac{a}{2}+\frac{\sigma^2}{a}\ln\frac{P(0)}{P(1)}$

$P(1)<1/2$，发"1"概率小于发"0"概率，$\ln\frac{P(0)}{P(1)}>0$，导致判决门限 b^* 增大，$b^*>\frac{a}{2}$

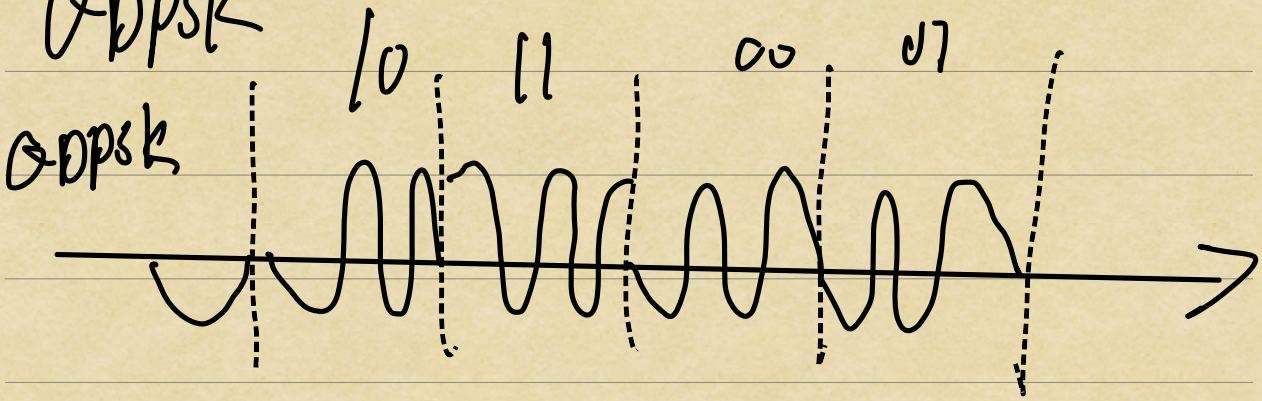
7-13.



QPSK



QDPSK



QDPSK