臺中健康暨管理學院

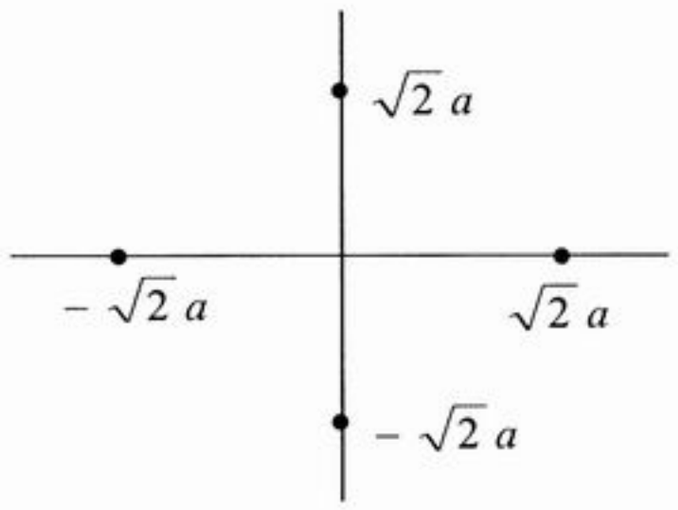
九十四學年度碩士班暨碩士在職專班招生考試試題紙

系　所　別	組 別	考試科目	考試日期	時　　間	備　　註
資訊學院碩士班	--	通訊理論	94.4.24	10:30-12:10	共二頁

1.Suppose you want to "match" the signal $x(t)=t,\ \ 0\le t\le 2,$ using a matched filter. Specify the time function of the filter. (5%)

2.The constellation of a QPSK modulation scheme is shown in the following. Assume that the symbols are equally likely and that the noise in each dimension is independent and Gaussian with variance σ^2. Find the symbol error probability in terms of $Q(\cdot)$ function, where

$$Q(x)\equiv\frac{1}{\sqrt{2\pi}}\int_x^\infty e^{-(y^2/2)}dy.\ \ (20\%)$$

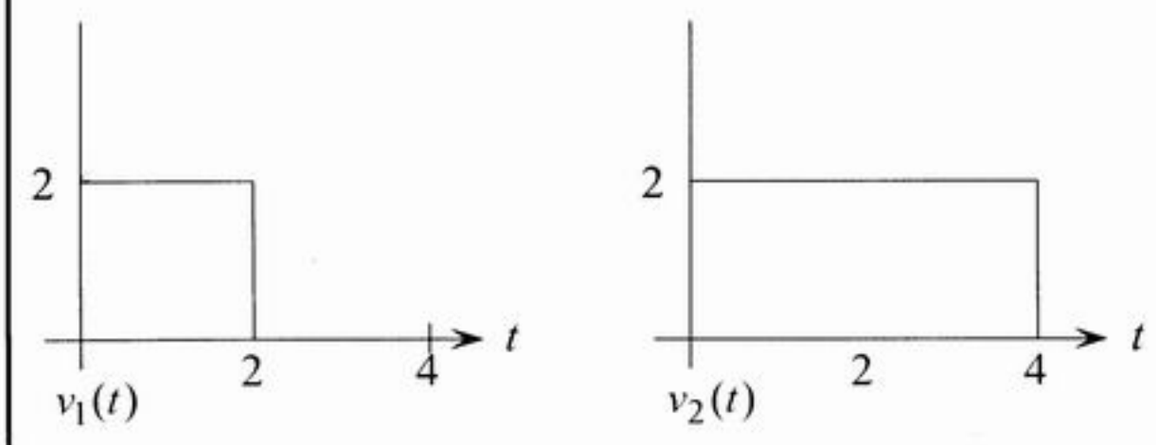


3. Show that the minimum frequency separation Δf for an MFSK modulation scheme is $\Delta f = 1/2T$, where T is the period of the symbols. (10%)

4. Show that the Hibert transform of the signal $\cos\omega_0 t$ is $\sin\omega_0 t$. (10%)

5. (a) Explain the term ISI (Intersymbol Interference).
(b) Specify a time function for transmitter filter which generates no ISI. (10%, 5 points each)

6. (a) Show that the two time function given in the following are not orthogonal over time 0~4.
(b) Define a new function $v(t)$ over 0~4 such that $v(t)$ and $v_2(t)$ are orthogonal.
(10%, 5 points each)



※試題請隨卷繳回

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7. Suppose a binary symbol a with $p_a(0)=q$ and $p_a(1)=1-q$ is transmitted over the BSC channel shown in the following. (25%, 5 points each)

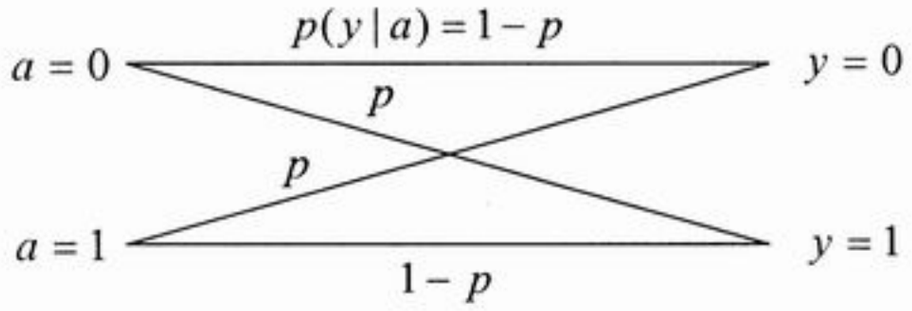
(a) Find the ML (Maximum likelihood) detection rule. Assume $p<0.5$.

(b) Find the probability of error of the ML detector as a function of p and q.

(c) Assume $p=0.2$ and $q=0.9$. Find the MAP (Maximum a-posteriori probability) detector and its error probability. Compare this probability of error to that in part (b).

(d) Find the general MAP detector for arbitrary p and q.

(e) Find the conditions on p and q such that the MAP detector always selects $\hat{a}=0$.



8. Evaluate the following integrals. (10%, 5 points each)

a) $\int_0^\infty \delta(t+2)e^{-2t}\cos\pi(t-5)dt$,　　b) $\int_{-\infty}^{\infty} e^{-j\omega t}d\omega$.