（1）

$$m_1 = \frac{1}{4}\sum_{j=1}^{4} x_{1j} = \frac{1}{4}[(0,0)^T + (2,0)^T + (2,2)^T + (0,2)^T] = (1,1)^T$$

$$m_2 = \frac{1}{4}\sum_{j=1}^{4} x_{2j} = \frac{1}{4}[(4,4)^T + (6,4)^T + (6,6)^T + (4,6)^T] = (5,5)^T$$

$$C_1 = \frac{1}{4}\sum_{j=1}^{4} (x_{1j} - m_1)(x_{1j} - m_1)^T = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$$

$$C_2 = \frac{1}{4}\sum_{j=1}^{4} (x_{2j} - m_2)(x_{2j} - m_2)^T = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$$

$$\therefore\ C_1 = C_2 = C = I_2 = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} \qquad C^{-1} = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} = I_2$$

判别界面为：

$$d_1(x) - d_2(x)$$

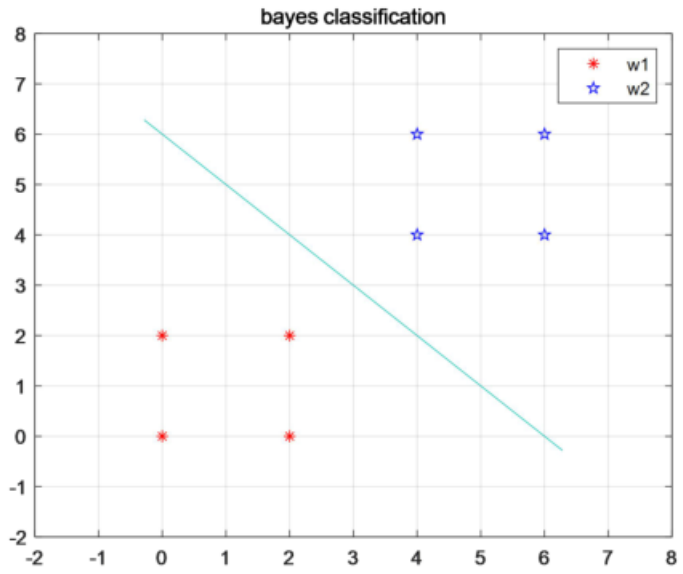
$$= lnP(w_1) - lnP(w_2) + (m_1 - m_2)^T C^{-1} x - \frac{1}{2} m_1^T C^{-1} m_1 + \frac{1}{2} m_2^T C^{-1} m_2$$

$$= 0$$

代入可得：

$$x_1 + x_2 = 6$$

(2)



（编程）

```
x1=[0 0 2 2]';
x2=[0 2 2 0]';
y1=[4 4 6 6]';
```

```
y2=[4 6 6 4]';
pw1=0.5;
pw2=0.5;
m1(1)=mean(x1);
m1(2)=mean(x2);
m2(1)=mean(y1);
m2(2)=mean(y2);
m1=[m1(1);m1(2)];
m2=[m2(1);m2(2)];
c1=zeros(2,2);
for i=1:4
    k=[x1(i);x2(i)];
    c1=c1+(k-m1)*(k-m1)';
end
c1=c1/4;
c2=zeros(2,2);
for i=1:4
    k=[y1(i);y2(i)];
    c2=c2+(k-m2)*(k-m2)';
end
c2=c2/4;
figure(1)
plot(x1,x2,'r*')
hold on
plot(y1,y2,'bp')
hold on
if (c1==c2)&(pw1==pw2)
    c=c1;
    syms xx xy
    x = [xx xy]';
    ezplot((m1-m2)'*inv(c)*x-0.5*m1'*inv(c)*m1+0.5*m2'*inv(c)*m2==0)
end
legend('w1','w2')
title('bayes classification')
grid on
axis([-2 8 -2 8])
hold off
```

结果同上（2）图示。