6.20 The weights of a large number of miniature poodles are approximately normally distributed with a mean of 8 kilograms and a standard deviation of 0.9 kilogram. If measurements are recorded to the nearest tenth of a kilogram, find the fraction of these poodles with weights

(a) over 9.5 kilograms;

(b) of at most 8.6 kilograms;

(c) between 7.3 and 9.1 kilograms inclusive.

(a)

$$z = \frac{9.5 - 8}{0.9} = 1.72$$

$$P(X > 9.5) = P(z > 1.72) = 0.0427$$

(b)

$$z = \frac{8.6 - 8}{0.9} = 0.67$$

$$P(X < 0.67) = 0.7486$$

(c)

$$z_1 = \frac{7.3 - 8}{0.9} = -0.78$$

$$z_2 = \frac{9.1 - 8}{0.9} = 1.44$$

$$P(-0.78 < z < 1.44) = 0.9236 - 0.2206$$

$$= 0.7030$$

6.28 As part of the research on "the role of English as a gateway to knowledge", a survey is conducted among 1000 college students, in which 72% of the students agree with the statement. If 100 students are picked at random, what is the probability that

(a) at least 80 of them agree with the statement?

(b) at most 68 of them agree with the statement?

$\mu = 100 \times 0.72 = 72$ $\quad \sigma = \sqrt{100 \times 0.72 \times 0.28} = 4.49$

(a)

$$z = \frac{80 - 72}{4.49} = 1.78$$

$$P(X > 80) = P(z > 1.78) = 1 - 0.9625$$

$$= 0.0375$$

(b)

$$z = \frac{68 - 72}{4.49} = -0.89$$

$$P(X < 68) = P(z < -0.89) = 0.1894$$

6.58 The number of automobiles that arrive at a certain intersection per minute has a Poisson distribution with a mean of 5. Interest centers around the time that elapses before 10 automobiles appear at the intersection.

(a) What is the probability that more than 10 automobiles appear at the intersection during any given minute of time?

(b) What is the probability that more than 2 minutes elapse before 10 cars arrive?

$\mu = \beta = 5$

$\frac{1}{\beta} = \frac{1}{5}$

$\alpha = 10$

(a)

$$P(X > 10) = 1 - P(X \leq 10)$$

$$= 1 - 0.9863$$

$$= 0.0137$$

(b)

$P(X > 2)$ before 10 cars arrive

$$P(X \le 2) = \int_0^2 \frac{1}{\beta^\alpha} \frac{x^{\alpha-1} e^{-x/\beta}}{\Gamma(\alpha)} dx$$

$$F(x;\alpha) = \int_0^x \frac{y^{\alpha-1} e^{-y}}{\Gamma(\alpha)} dy \qquad \left(y = \frac{x}{\beta}\right)$$

$x = \beta \cdot y$

$\therefore P(X \le 2) = P(X \le 10)$

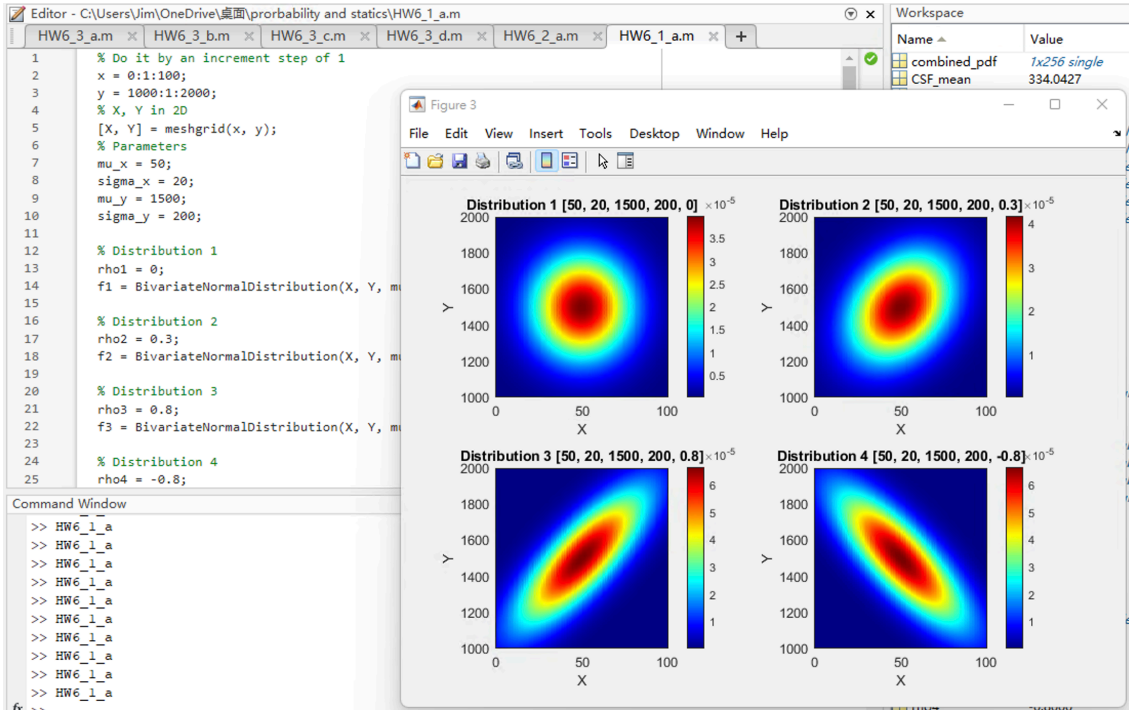
$= F(10;10) = 0.542$

with $P(X > 2) = 1 - P(X \le 2) = 1 - 0.542$

$= 0.458$

Matlab

1. (a)



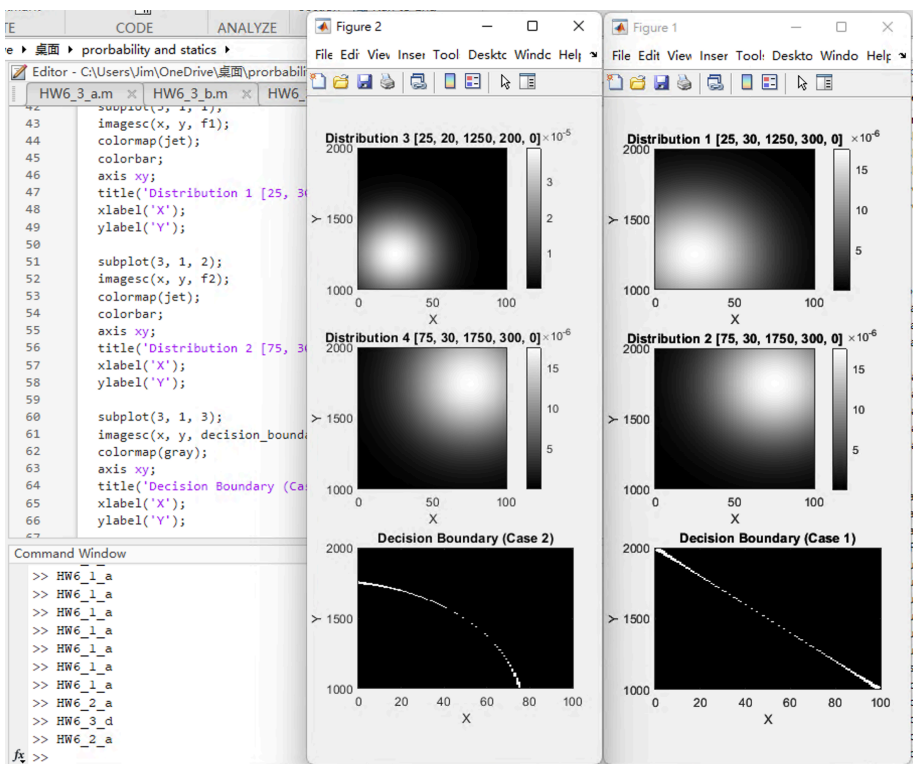
1. (b)

不同點在於 ρ 的值的改變

ρ 越大，圖形越壓縮，越像橢圓形

$\rho < 0$ 時，則圖形斜率由正變為負

2. (a)

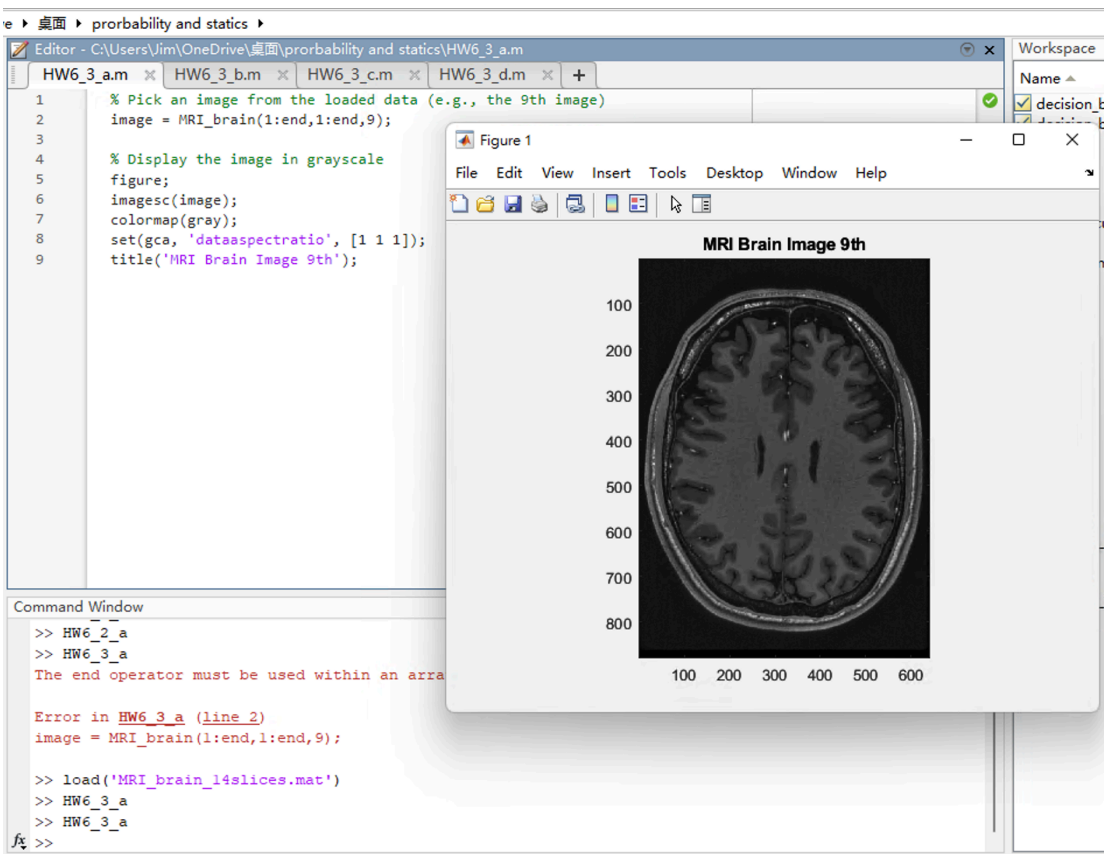


2.(b)

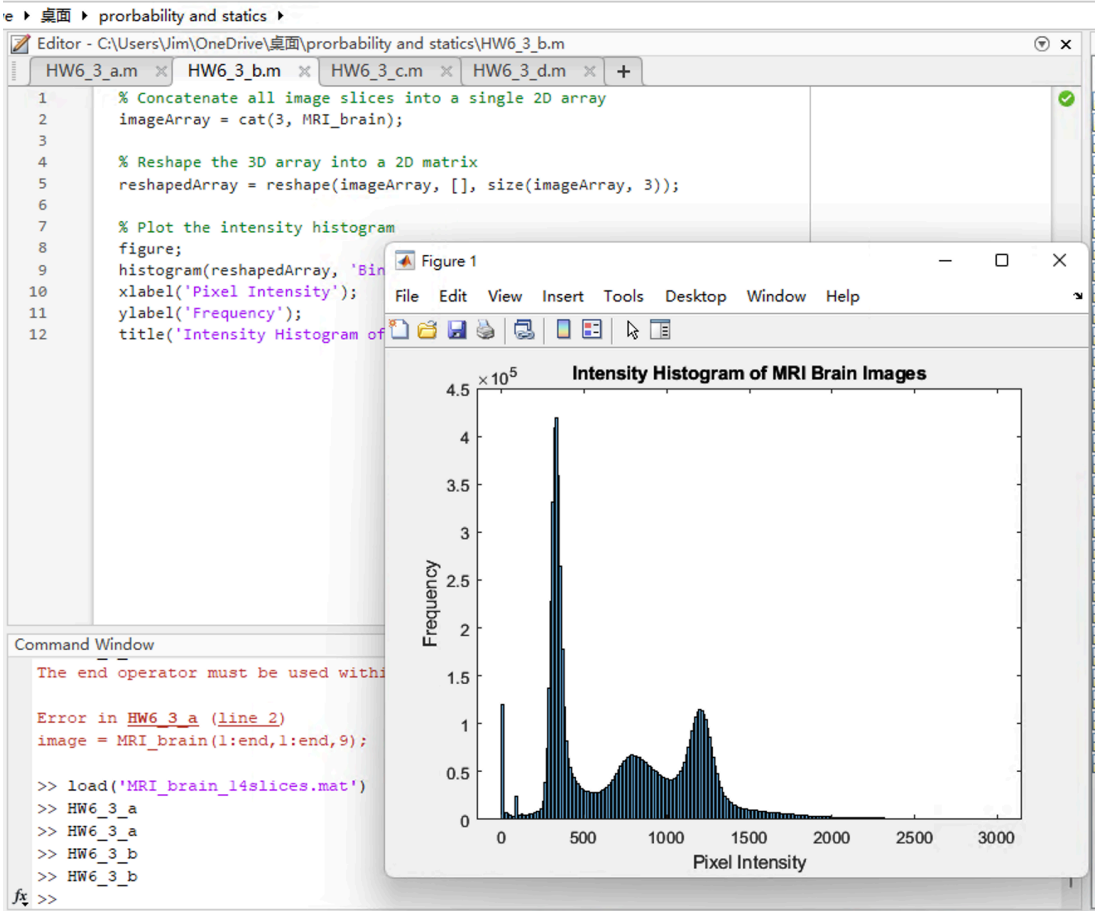
可以從 distribution 1 和 distribution 3 的圖發現，σ_x, σ_y 越，分佈圖所占的範圍越小

也因為改變了 σ_x, σ_y 導致了 decision boundary 的改變

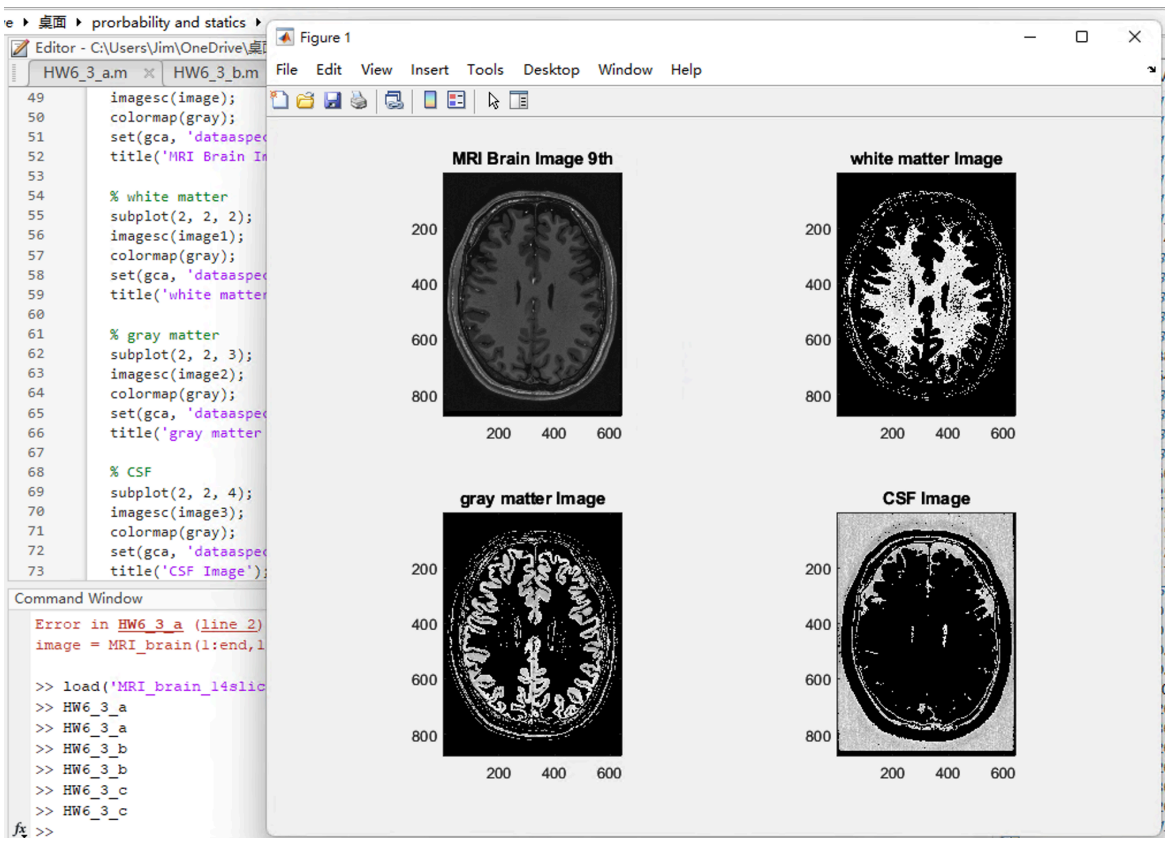
3.(a) the 9th image



3(b)


桌面 ▸ prorbability and statics ▸
Editor - C:\Users\Jim\OneDrive\桌面\prorbability and statics\HW6_3_b.m
HW6_3_a.m
HW6_3_b.m
HW6_3_c.m
HW6_3_d.m
% Concatenate all image slices into a single 2D array
imageArray = cat(3, MRI_brain);
% Reshape the 3D array into a 2D matrix
reshapedArray = reshape(imageArray, [], size(imageArray, 3));
% Plot the intensity histogram
figure;
histogram(reshapedArray, 'Bin
xlabel('Pixel Intensity');
ylabel('Frequency');
title('Intensity Histogram of
Figure 1
File Edit View Insert Tools Desktop Window Help
Intensity Histogram of MRI Brain Images
×10^5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
Frequency
0 500 1000 1500 2000 2500 3000
Pixel Intensity
Command Window
The end operator must be used withi
Error in HW6_3_a (line 2)
image = MRI_brain(1:end,1:end,9);
>> load('MRI_brain_14slices.mat')
>> HW6_3_a
>> HW6_3_a
>> HW6_3_b
>> HW6_3_b
>>
fx

3.cc)


桌面 ▸ prorbability and statics ▸
Editor - C:\Users\Jim\OneDrive\桌
HW6_3_a.m
HW6_3_b.m
imagesc(image);
colormap(gray);
set(gca, 'dataaspec
title('MRI Brain In
% white matter
subplot(2, 2, 2);
imagesc(image1);
colormap(gray);
set(gca, 'dataaspec
title('white matter
% gray matter
subplot(2, 2, 3);
imagesc(image2);
colormap(gray);
set(gca, 'dataaspec
title('gray matter
% CSF
subplot(2, 2, 4);
imagesc(image3);
colormap(gray);
set(gca, 'dataaspec
title('CSF Image');
Command Window
Error in HW6_3_a (line 2)
image = MRI_brain(1:end,1
>> load('MRI_brain_14slic
>> HW6_3_a
>> HW6_3_a
>> HW6_3_b
>> HW6_3_b
>> HW6_3_c
>> HW6_3_c
>>
fx
Figure 1
File Edit View Insert Tools Desktop Window Help
MRI Brain Image 9th
white matter Image
gray matter Image
CSF Image
200 400 600 800
200 400 600

3. (d) CSF. 灰質. 白質三者的比例與題目給的相似