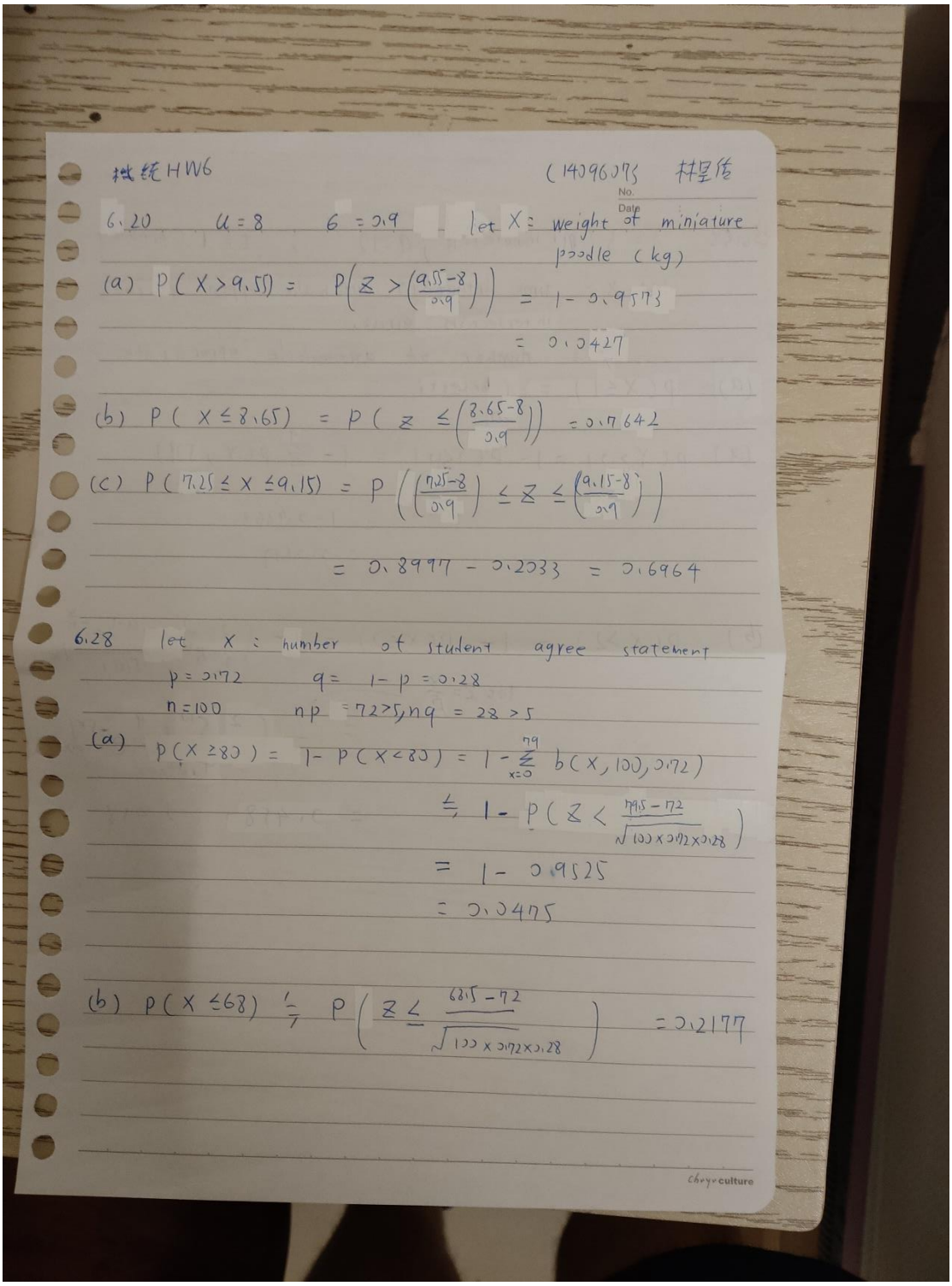
手寫



統計HW6 (1409603) 林昱佐

6.20 $\mu = 8$ $\sigma = 0.9$ let X = weight of miniature poodle (kg)

(a) $P(X > 9.55) = P\left(Z > \left(\frac{9.55-8}{0.9}\right)\right) = 1 - 0.9573$

$= 0.0427$

(b) $P(X \le 8.65) = P\left(Z \le \left(\frac{8.65-8}{0.9}\right)\right) = 0.7642$

(c) $P(7.25 \le X \le 9.15) = P\left(\left(\frac{7.25-8}{0.9}\right) \le Z \le \left(\frac{9.15-8}{0.9}\right)\right)$

$= 0.8997 - 0.2033 = 0.6964$

6.28 let X = number of student agree statement

$p = 0.72$ $q = 1 - p = 0.28$

$n = 100$ $np = 72 > 5, nq = 28 > 5$

(a) $P(X \ge 80) = 1 - P(X < 80) = 1 - \sum_{x=0}^{79} b(x, 100, 0.72)$

$\approx 1 - P\left(Z < \frac{79.5 - 72}{\sqrt{100 \times 0.72 \times 0.28}}\right)$

$= 1 - 0.9525$

$= 0.0475$

(b) $P(X \le 68) \approx P\left(Z \le \frac{68.5 - 72}{\sqrt{100 \times 0.72 \times 0.28}}\right) = 0.2177$

No.
Date

6.58 $\lambda = 5$ (per minute) $= \frac{1}{13}$, $a = 10$, $t = 1$ (minute)

let X = time in minutes that elapse before 10 automobiles arrive.

Y = number of automobile apper at the intersection

(a) $P(Y \geq 10) = 1 - P(Y \leq 10) = 1 - \sum_{0}^{10} p(y, 5 \times 1)$

$= 1 - 0.9863$

$= 0.0137$

(b) $P(X > 2) = 1 - P(X \leq 2) = 1 - \int_{0}^{2} \frac{1}{\beta^a} \frac{x^{a-1} e^{-\frac{x}{\beta}}}{\Gamma(a)} dx$

let $Z = \frac{X}{\beta}$

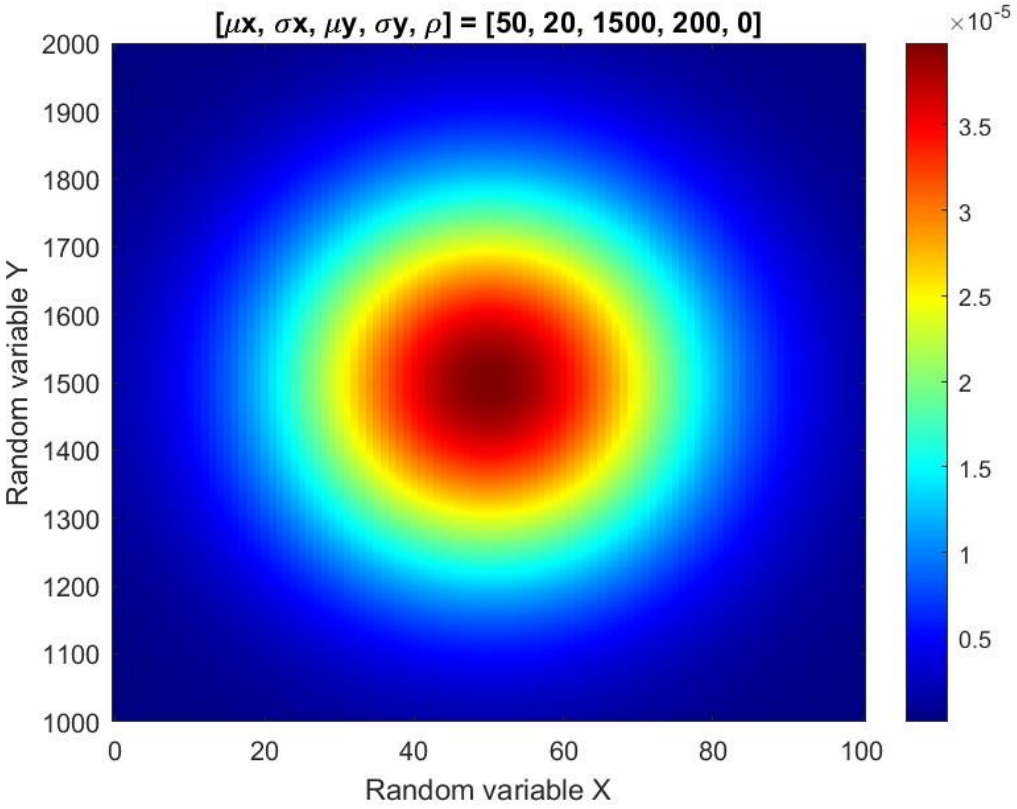
$= 1 - \int_{0}^{10} \frac{z^{10-1} e^{-z}}{\Gamma(10)} dz$

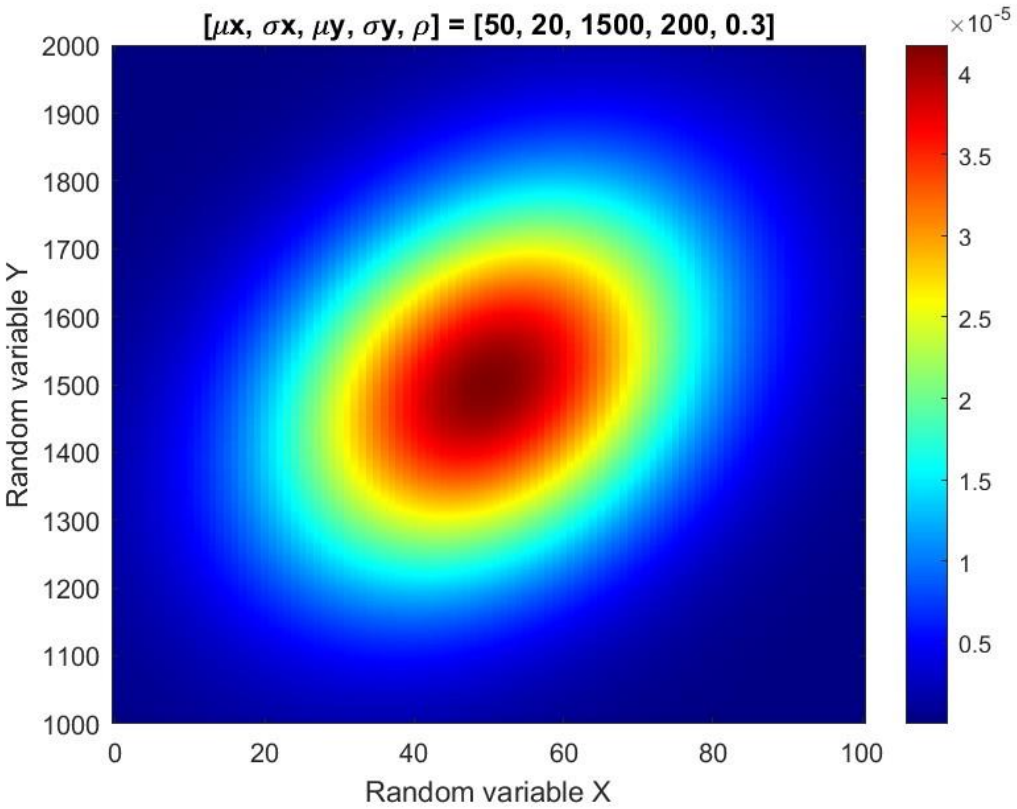
$= 1 - 0.542 = 0.458$

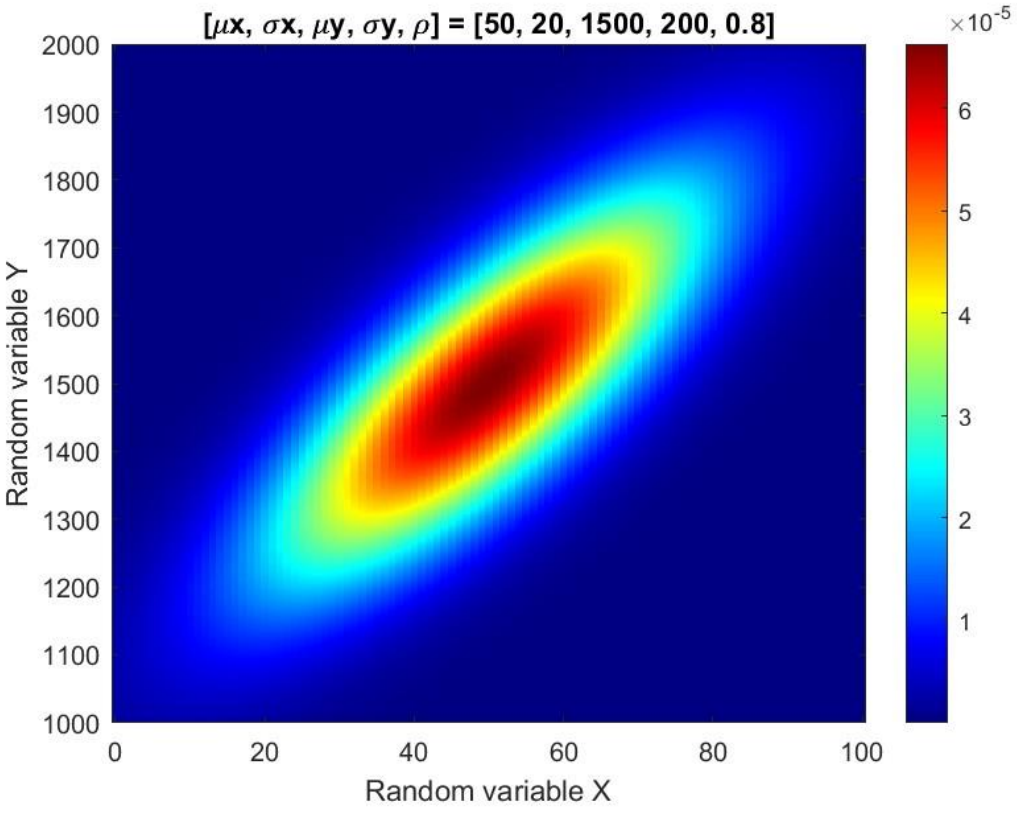
Chey-culture

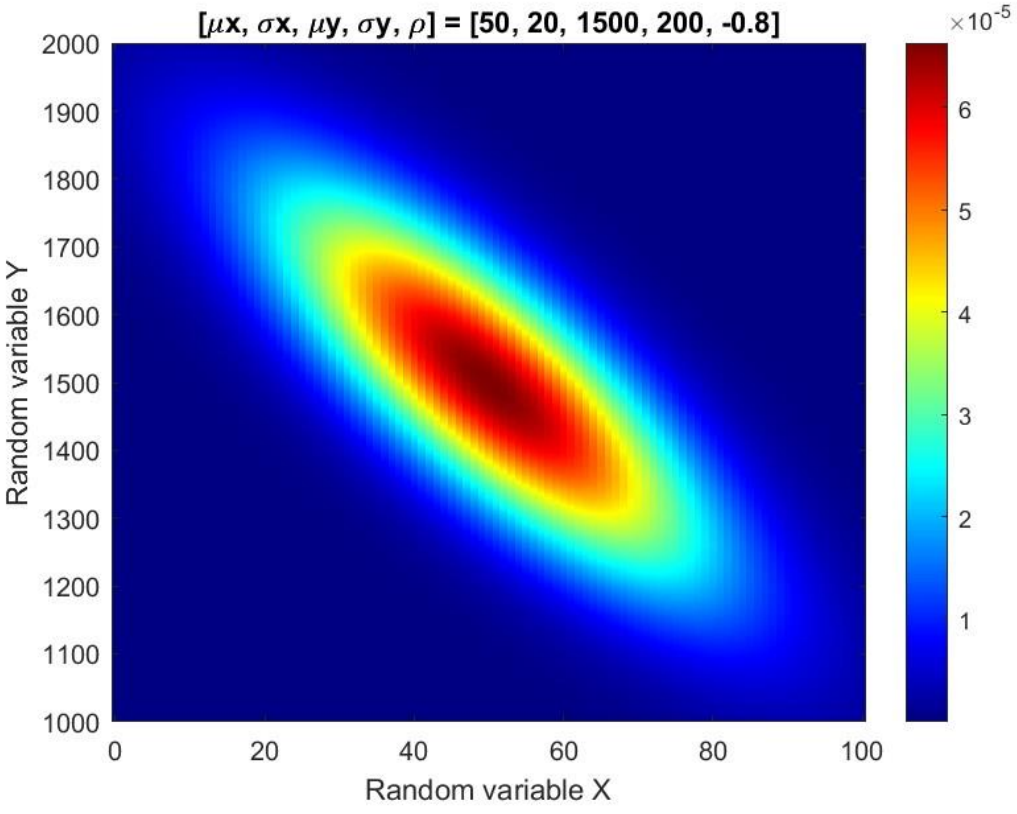
Matlab

1(a)


[μx, σx, μy, σy, ρ] = [50, 20, 1500, 200, 0]
×10^-5
Random variable Y
Random variable X
2000
1900
1800
1700
1600
1500
1400
1300
1200
1100
1000
0
20
40
60
80
100
3.5
3
2.5
2
1.5
1
0.5


[μx, σx, μy, σy, ρ] = [50, 20, 1500, 200, 0.3]
×10^-5
Random variable Y
Random variable X
2000
1900
1800
1700
1600
1500
1400
1300
1200
1100
1000
0
20
40
60
80
100
4
3.5
3
2.5
2
1.5
1
0.5

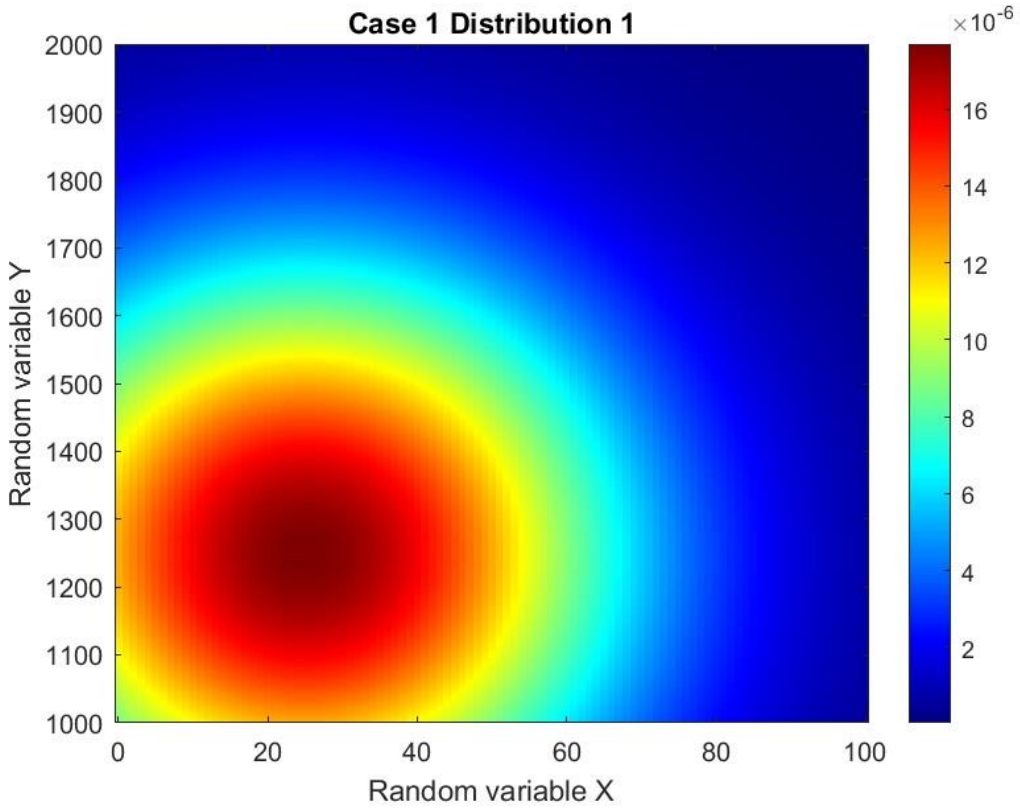

[μx, σx, μy, σy, ρ] = [50, 20, 1500, 200, 0.8]
×10^-5
6
5
4
3
2
1
2000
1900
1800
1700
1600
1500
1400
1300
1200
1100
1000
Random variable Y
0
20
40
60
80
100
Random variable X

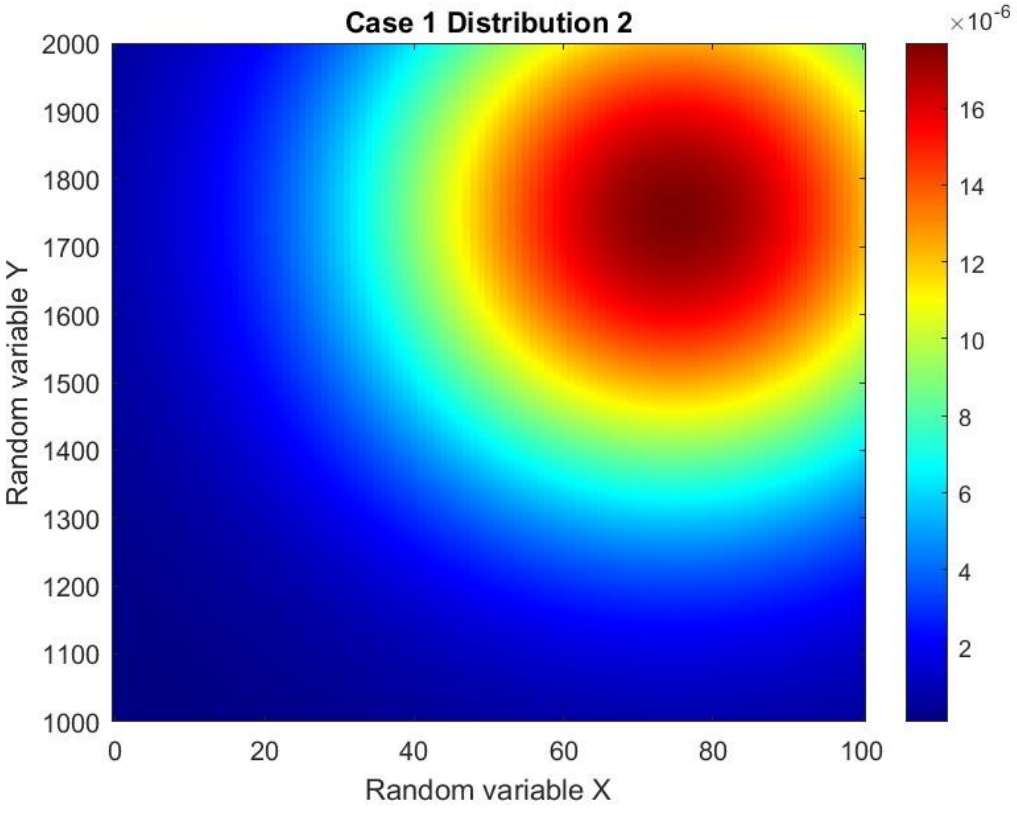

[μx, σx, μy, σy, ρ] = [50, 20, 1500, 200, -0.8]
×10^-5
6
5
4
3
2
1
2000
1900
1800
1700
1600
1500
1400
1300
1200
1100
1000
Random variable Y
0
20
40
60
80
100
Random variable X

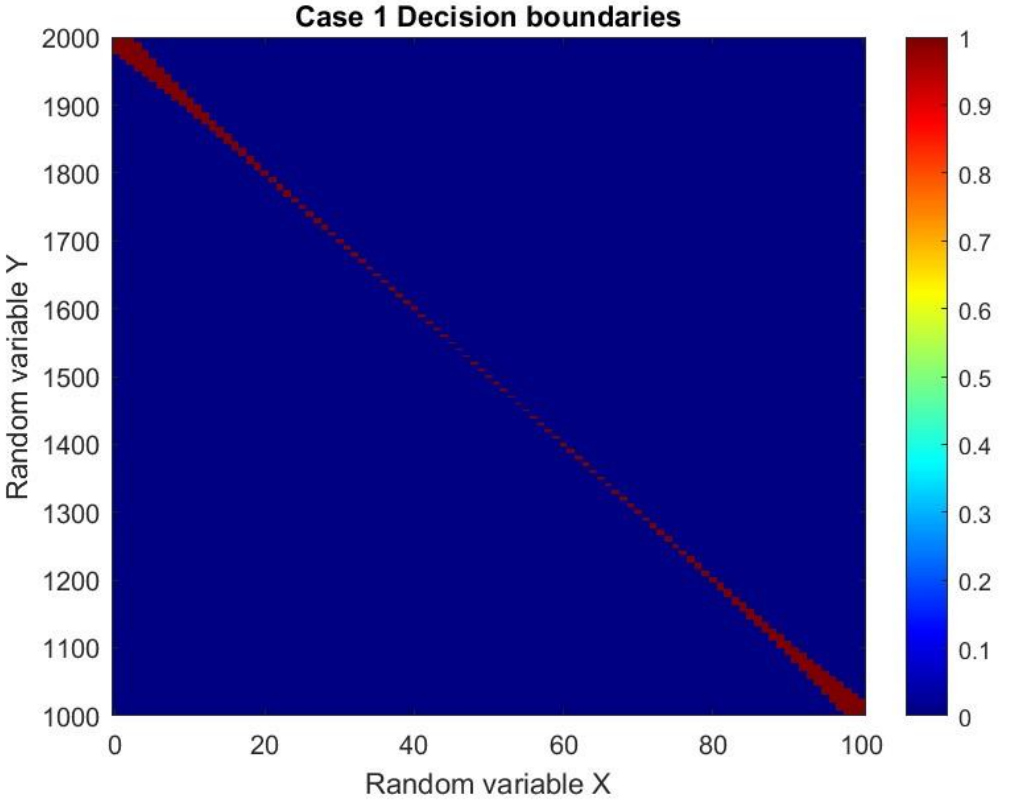
1(b)

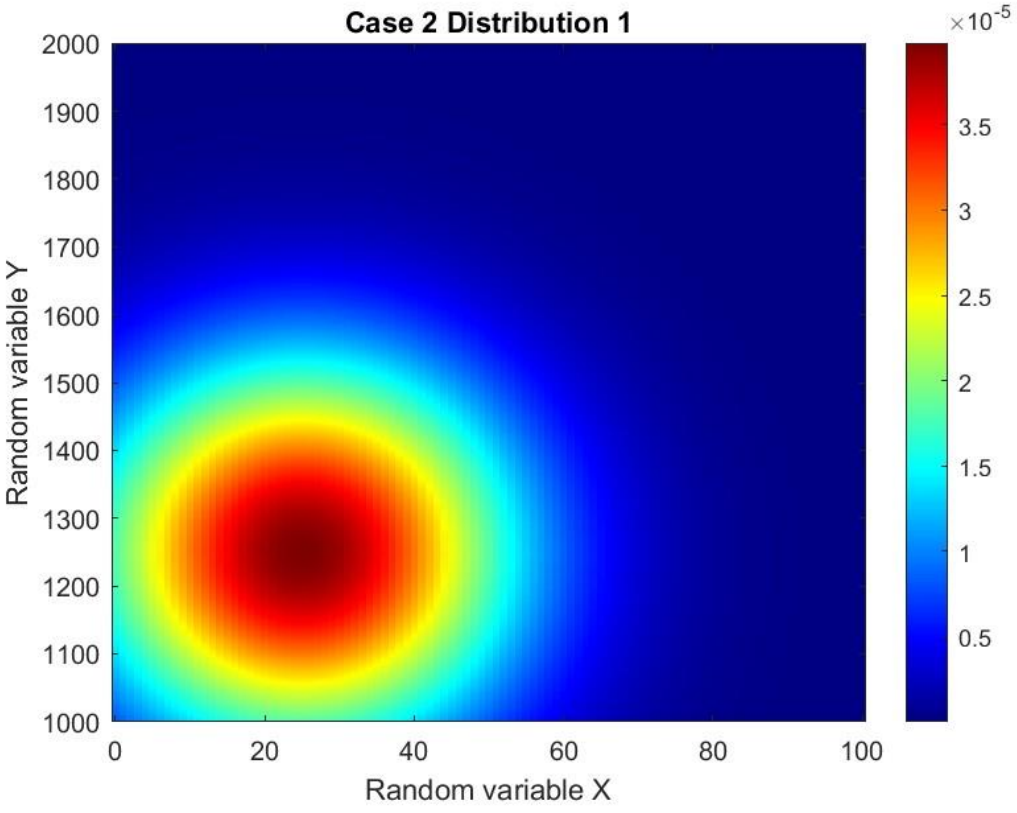
當 ρ 是 0 的時候，產生的圖 像是以(μx, μy)為中心的同心圓，而 ρ 不是零的時候圖開始變得扁平而且往對角方向斜，從 Distribution2 跟 3 可以知道 ρ 越大，扁平、傾斜程度越大，而從 Distribution 3 跟 4 可知道 ρ 的正負只會影響傾斜的方向。

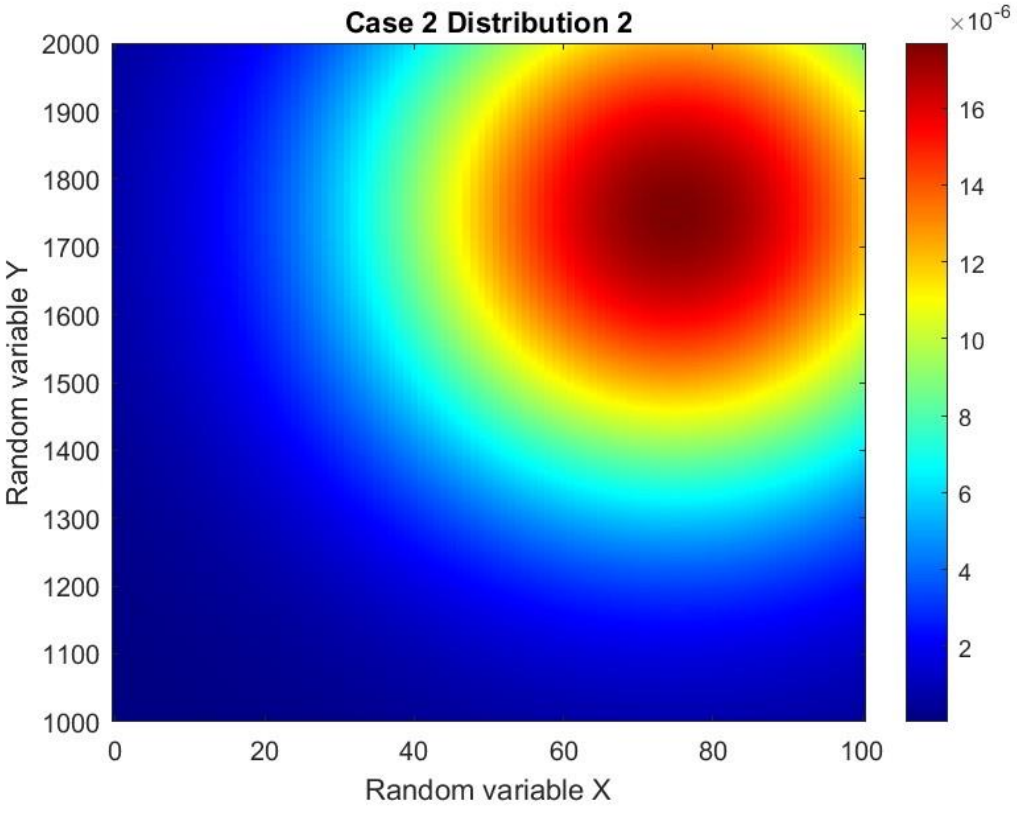
2(a)

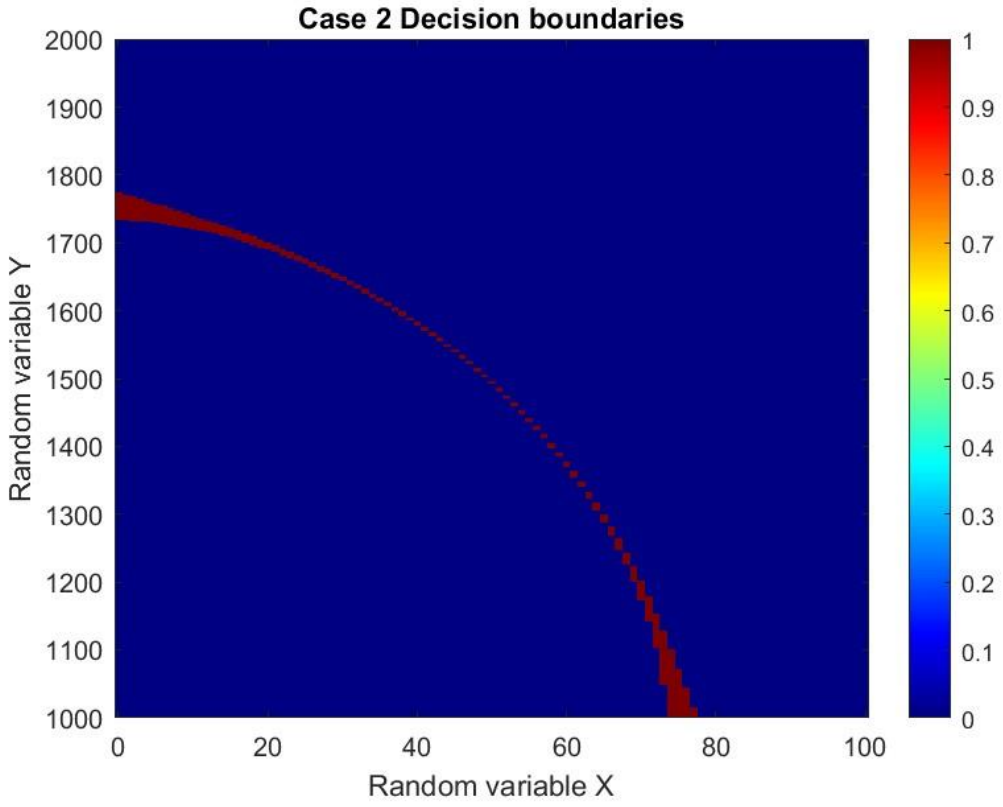



Case 1 Distribution 2
×10^-6
16
14
12
10
8
6
4
2
2000
1900
1800
1700
1600
1500
1400
1300
1200
1100
1000
Random variable Y
0
20
40
60
80
100
Random variable X


Case 1 Decision boundaries
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
2000
1900
1800
1700
1600
1500
1400
1300
1200
1100
1000
Random variable Y
0
20
40
60
80
100
Random variable X


Case 2 Distribution 1
×10^-5
3.5
3
2.5
2
1.5
1
0.5
2000
1900
1800
1700
1600
1500
1400
1300
1200
1100
1000
Random variable Y
0
20
40
60
80
100
Random variable X

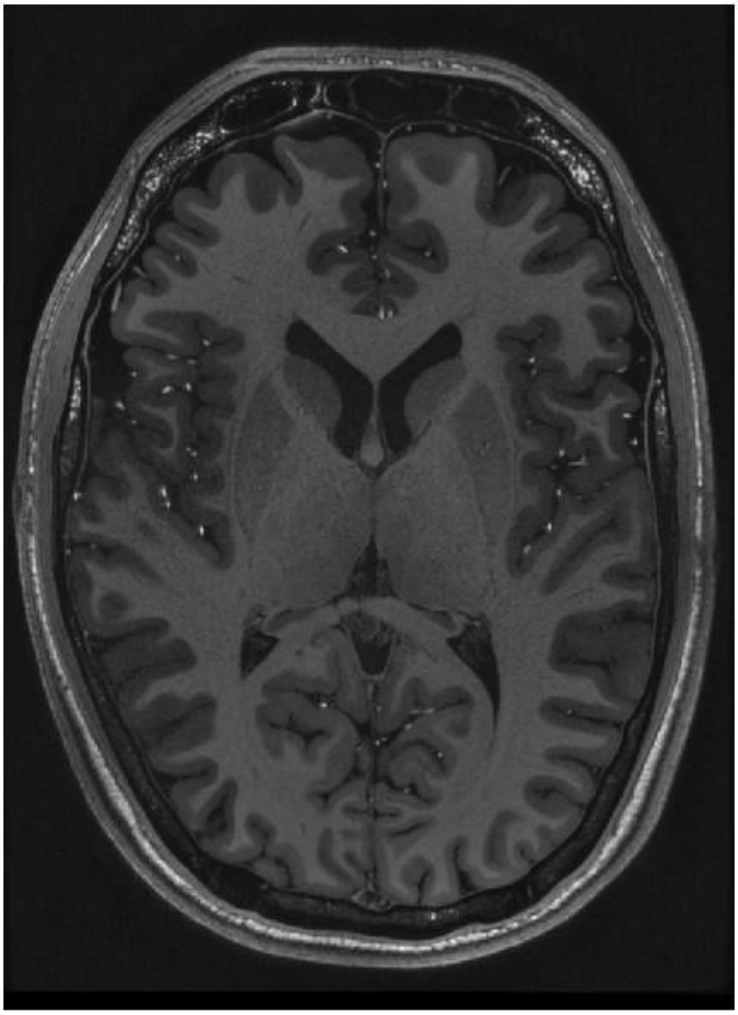

Case 2 Distribution 2
×10^-6
16
14
12
10
8
6
4
2
2000
1900
1800
1700
1600
1500
1400
1300
1200
1100
1000
Random variable Y
0
20
40
60
80
100
Random variable X



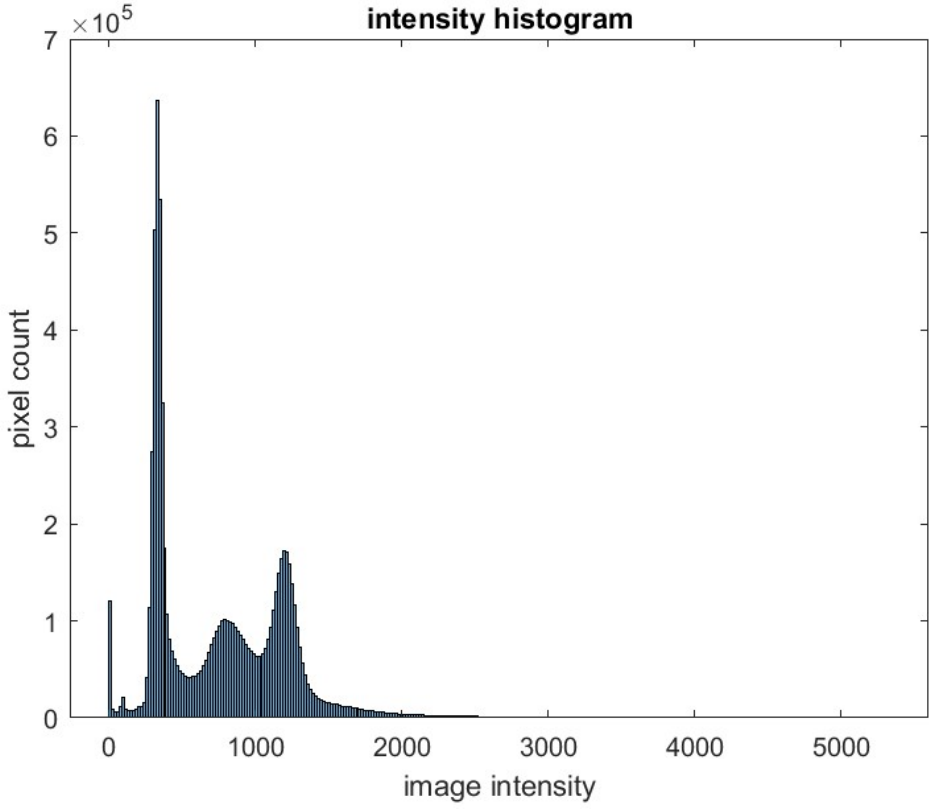
2(b)

Case 1.2 的差別僅有 Distribution 1 的σx , σy，在 case1 中 Distribution 1 和 Distribution 2 的σx , σy 相同，加上 Distribution 1 和 Distribution 2 的 (μx, μy)離圖的中心(50,1500)距離也一樣，所以 decision boundaries 才會像是一條斜直線而且大概在圖的正中間。而 Case 2 的 Distribution 1 的σx , σy 較 case1 的 Distribution 1 的σx , σy 小，所以 decision boundaries 才會偏向左半邊。

3(a)

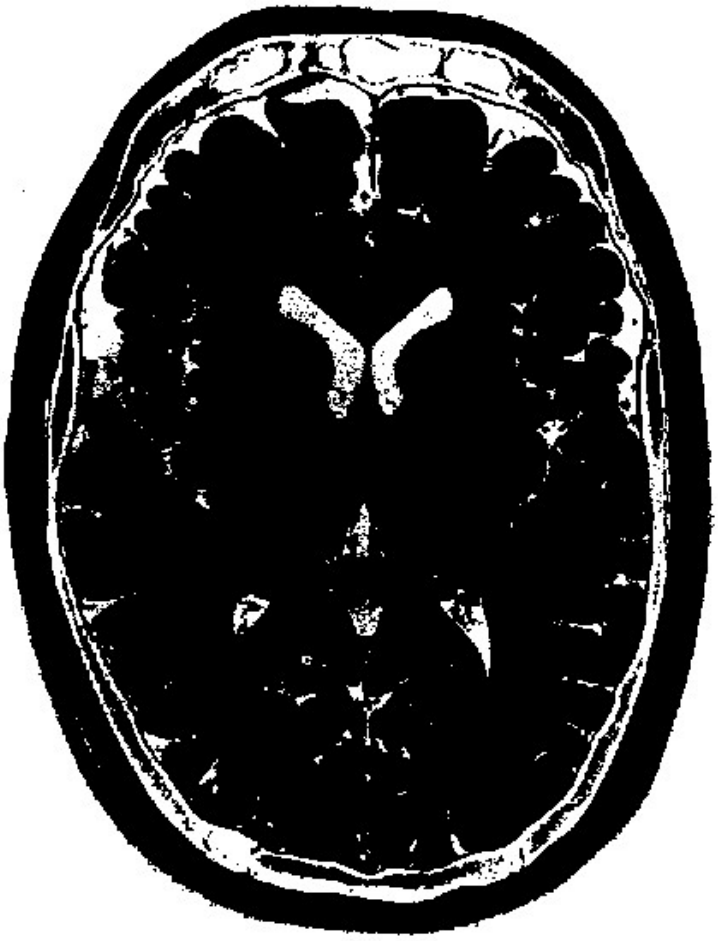


3(b)


intensity histogram
×10^5
7
6
5
4
3
2
1
0
pixel count
0
1000
2000
3000
4000
5000
image intensity

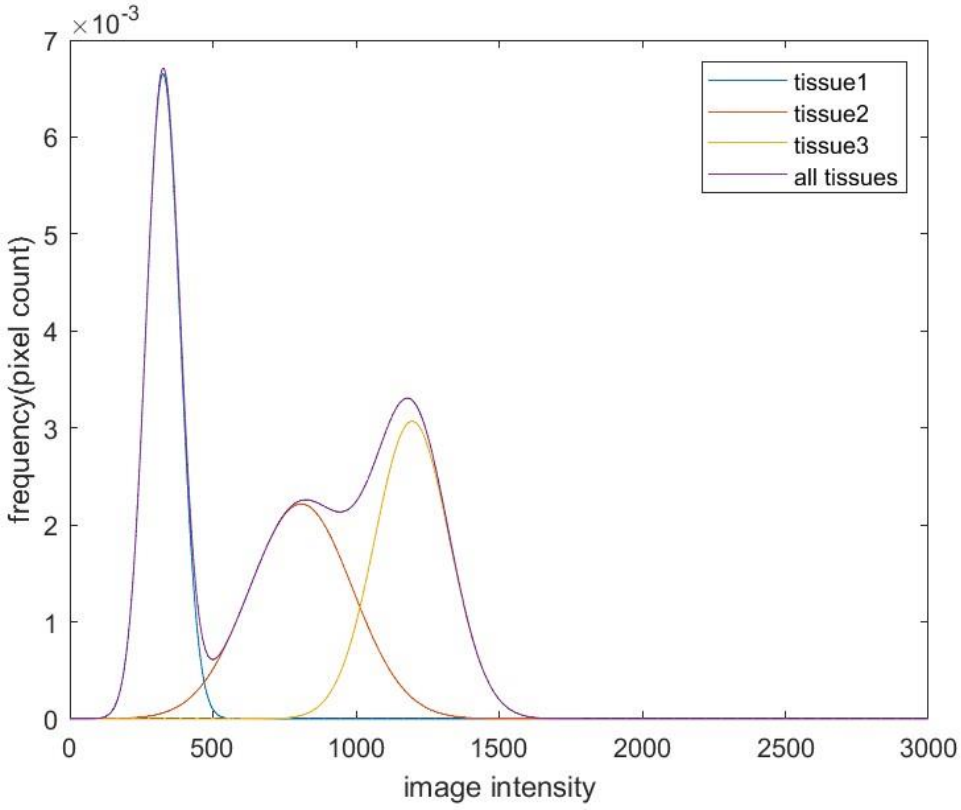
3(c)

binary mask 1



binary mask 2

3(d)



combined distribution 和 image intensity histogram 長得很像，因為是根據 image intensity histogram 決定 thresholds 以及三個 tissues 的 Gaussian distribution。