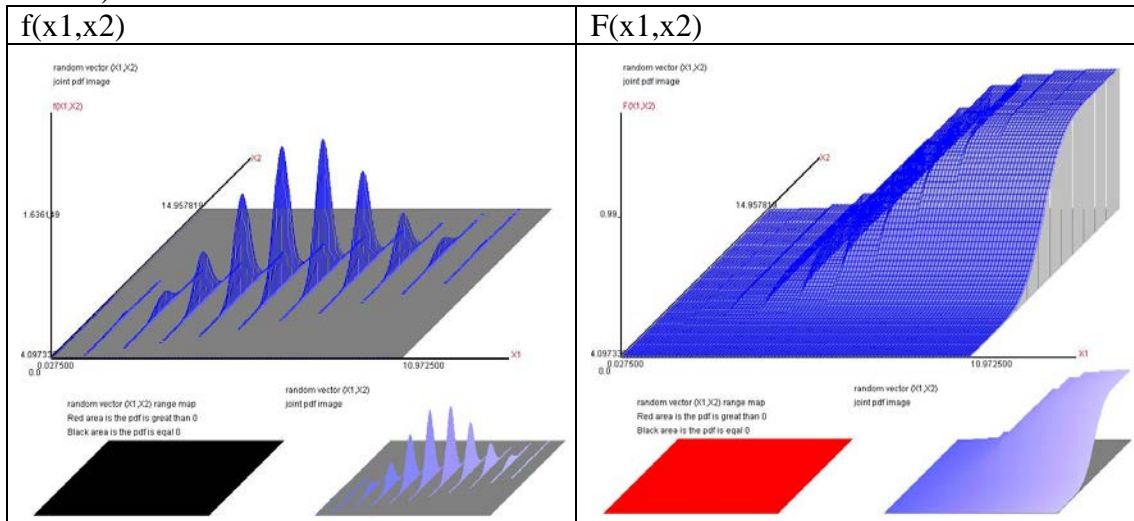




### 13.貝氏分配的機率分配模擬器

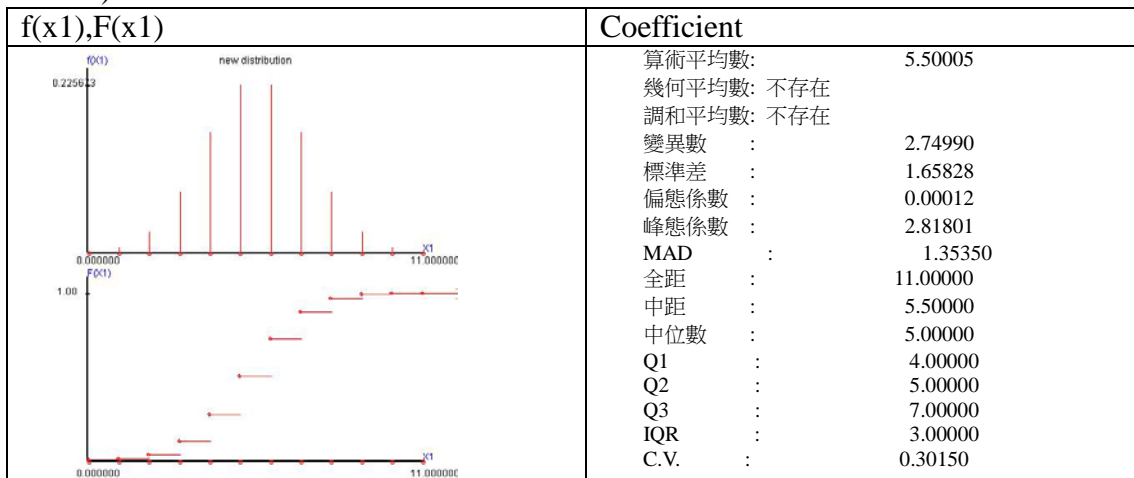
$$13.1) X_1 \sim B(n=11, p=0.5), X_2 \sim Normal(\mu = X_1, \sigma^2 = 1),$$

13.1.1)

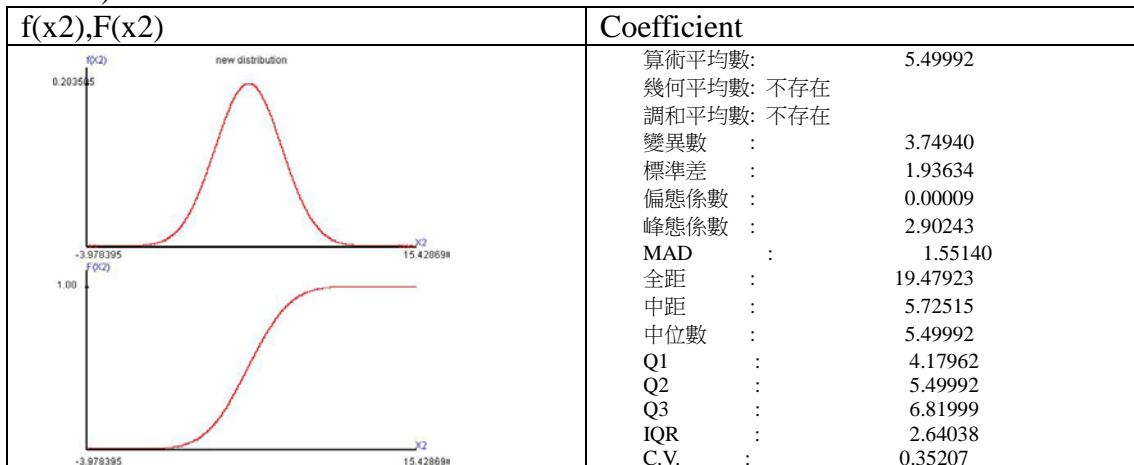


$E(X_1) = 5.4999$ ,  $Var(X_1) = 2.7494$   
 $E(X_2) = 5.4999$ ,  $Var(X_2) = 3.7498$   
 $Cov(X_1, X_2) = 2.7496$ ,  
 $X_1$  and  $X_2$  相關係數=0.8564.

13.1.2)



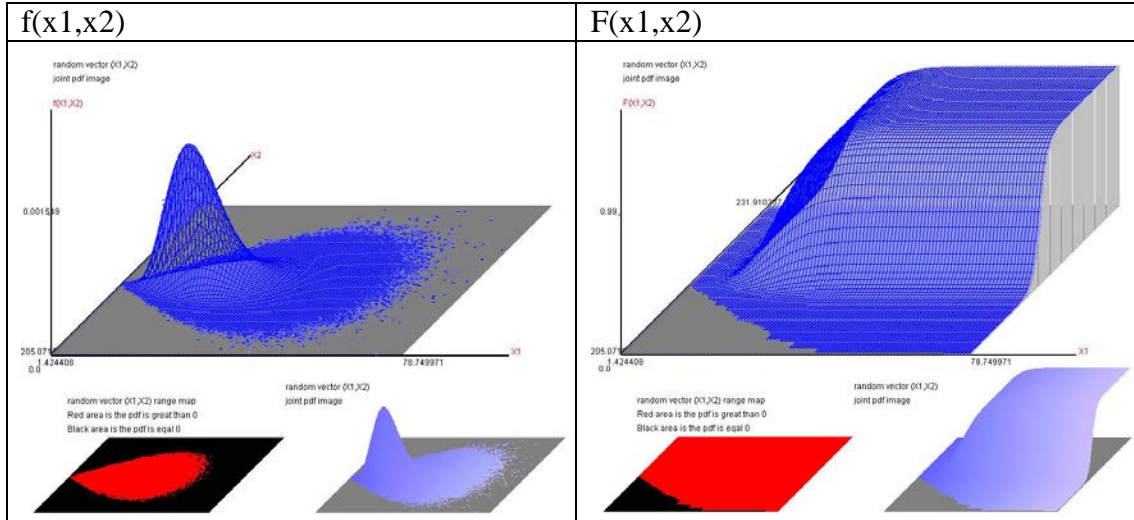
13.1.3)





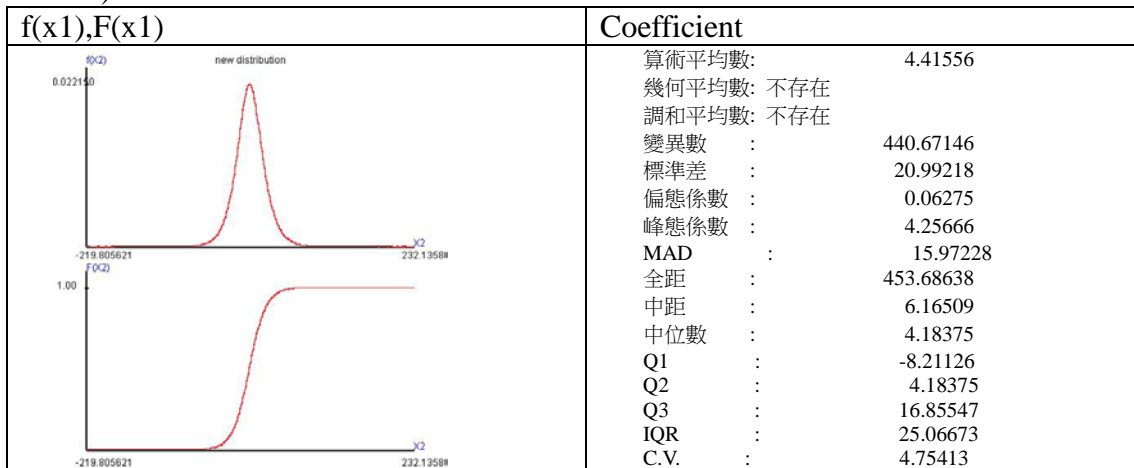
13.2)  $X_1 \sim \text{Gamma}(10,2), X_2 \sim \text{Normal}(\mu = \sqrt{X_1}, \sigma^2 = X_1^2)$

13.2.1)

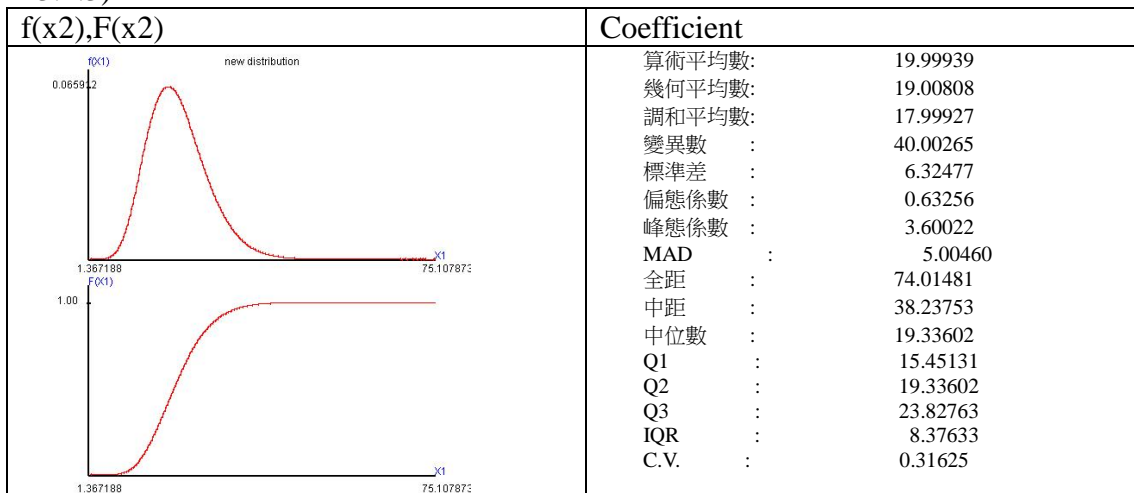


$E(X1)=$  20.0010,  $\text{Var}(X1)=$  40.0029  
 $E(X2)=$  4.4176,  $\text{Var}(X2)=$  440.6247  
 $\text{Cov}(X1,X2)=$  4.4446,  
 $X1$  and  $X2$  相關係數=0.0335.

13.2.2)



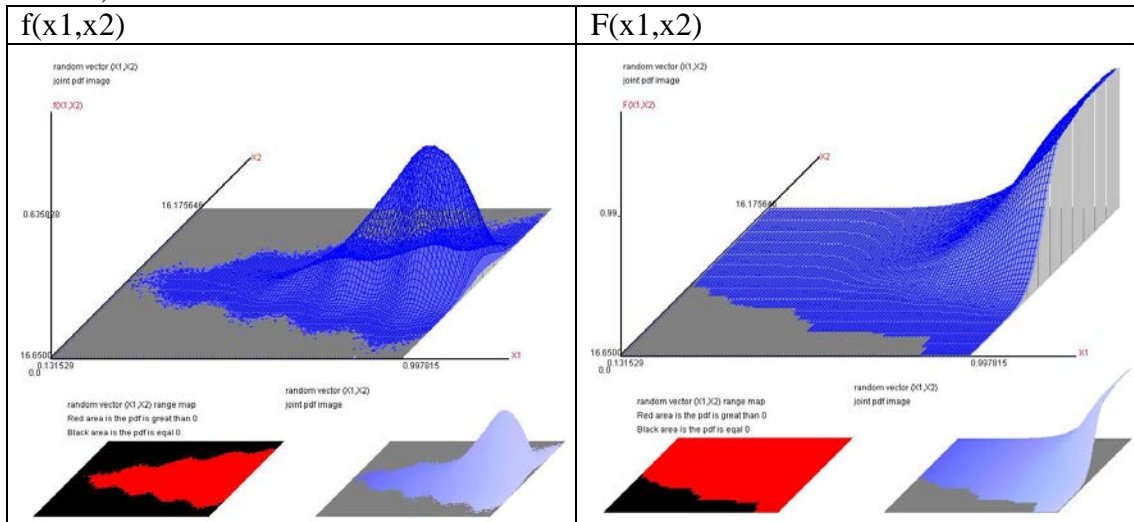
13.2.3)





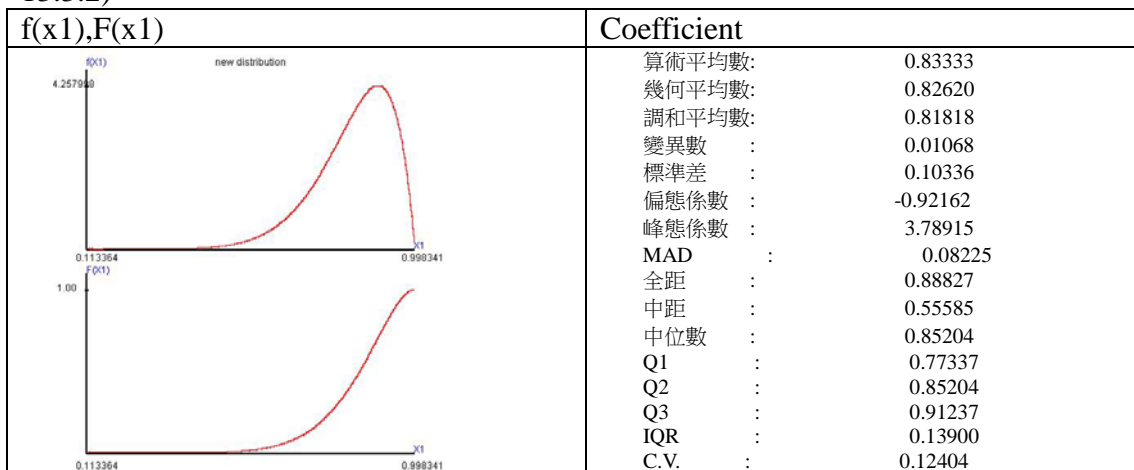
$$13.3) X_1 \sim \text{Beta}(10,2), X_2 \sim \text{Normal}(\mu = \cos(X_1 \times \pi), \sigma^2 = (X_1^2 + X_1 + 1)^2)$$

13.3.1)

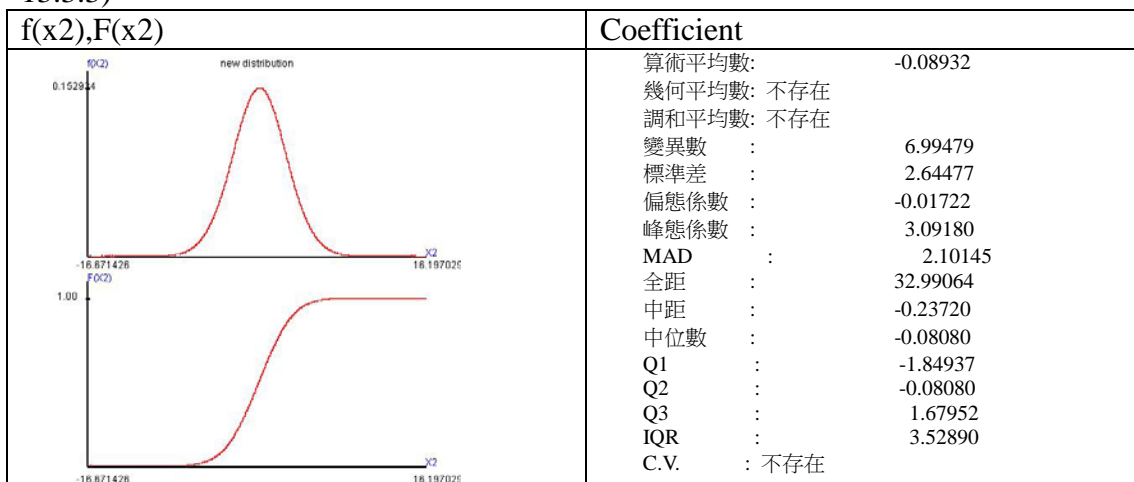


$E(X1)=$  0.8333,  $\text{Var}(X1)=$  0.0107  
 $E(X2)=$  -0.0894,  $\text{Var}(X2)=$  6.9940  
 $\text{Cov}(X1,X2)=$  -0.0098,  
 $X1$  and  $X2$  相關係數=-0.0358.

13.3.2)



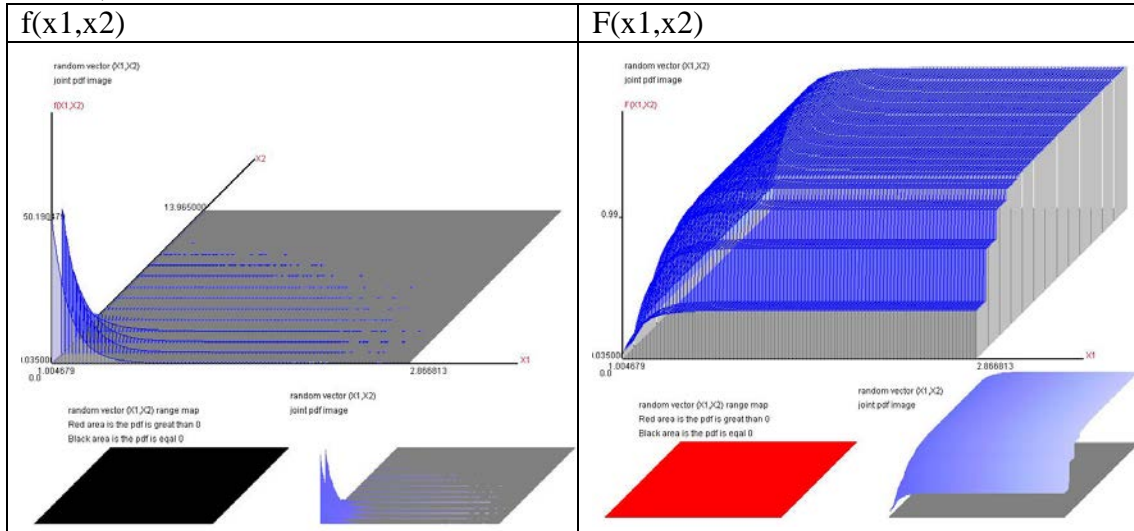
13.3.3)





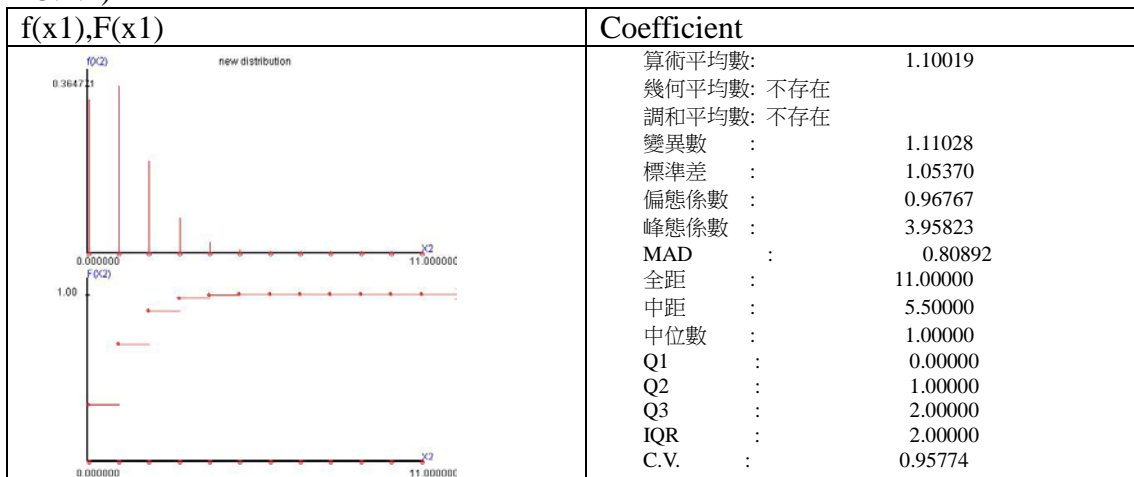
13.4)  $X_1 \sim \text{Shifted\_exponential}(\lambda = 10, c = 1), X_2 \sim \text{Poisson}(\lambda = X_1),$

13.4.1)

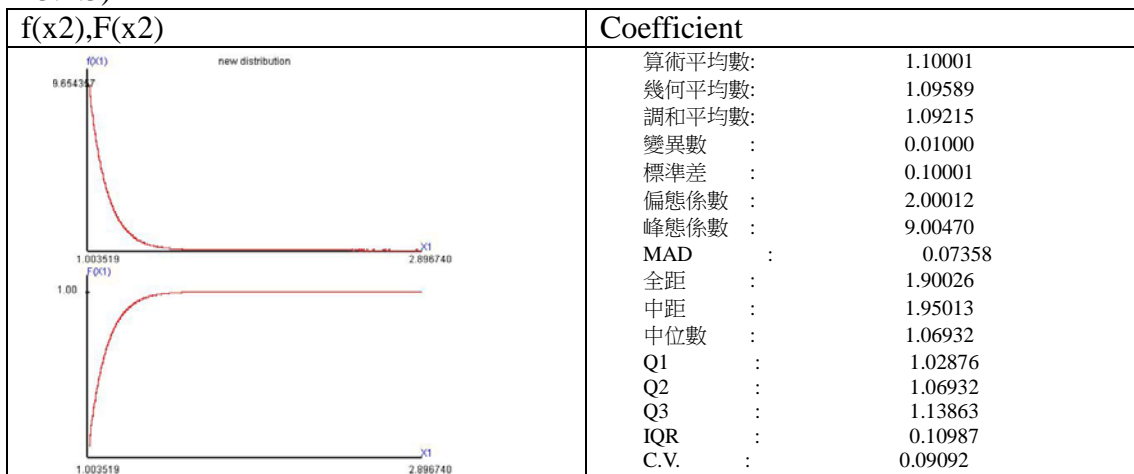


$E(X1)=$  1.1000,  $\text{Var}(X1)=$  0.0100  
 $E(X2)=$  1.1000,  $\text{Var}(X2)=$  1.1102  
 $\text{Cov}(X1,X2)=$  0.0100,  
 $X1$  and  $X2$  相關係數=0.0948.

13.4.2)



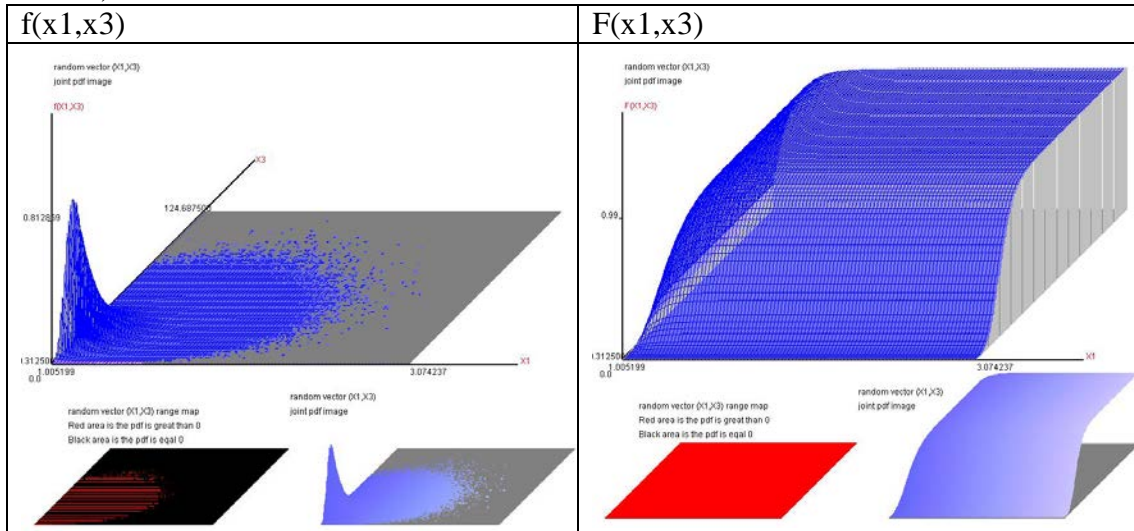
13.4.3)





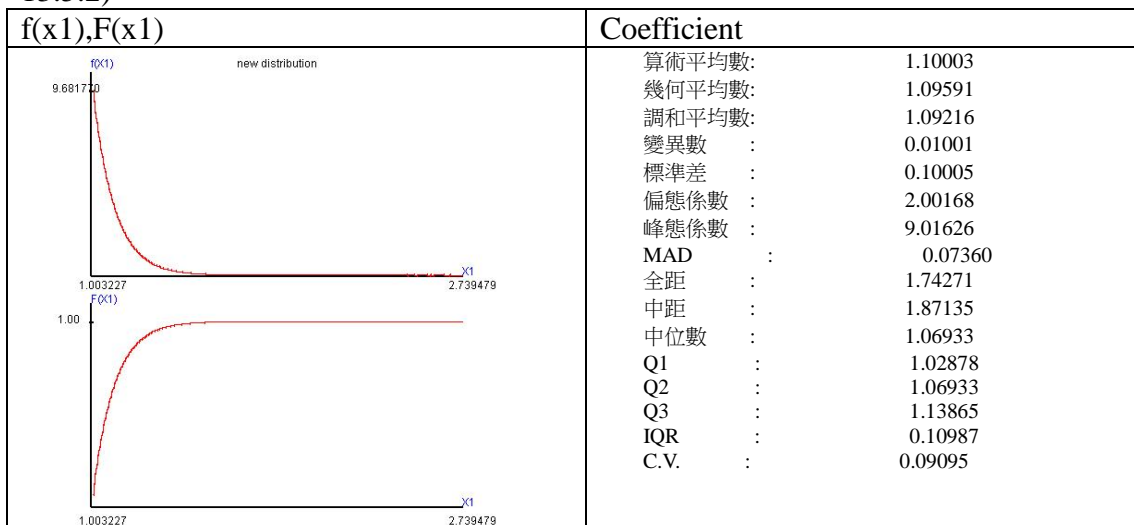
13.5)  $X_1 \sim \text{Shifted\_exponential}(\lambda = 10, c = 1)$ ,  $X_2 \sim \text{Gamma}(\alpha = 10, \beta = 2)$ ,  
 $X_3 \sim \text{Poisson}(\lambda = X_1 \times X_2)$ ,  $X_1$  and  $X_2$  are independent random variables.

13.5.1)



$E(X1) = 1.1000$ ,  $\text{Var}(X1) = 0.0100$   
 $E(X3) = 22.0003$ ,  $\text{Var}(X3) = 74.8143$   
 $\text{Cov}(X1, X3) = 0.2001$ ,  
 $X1$  and  $X3$  相關係數 = 0.2314.

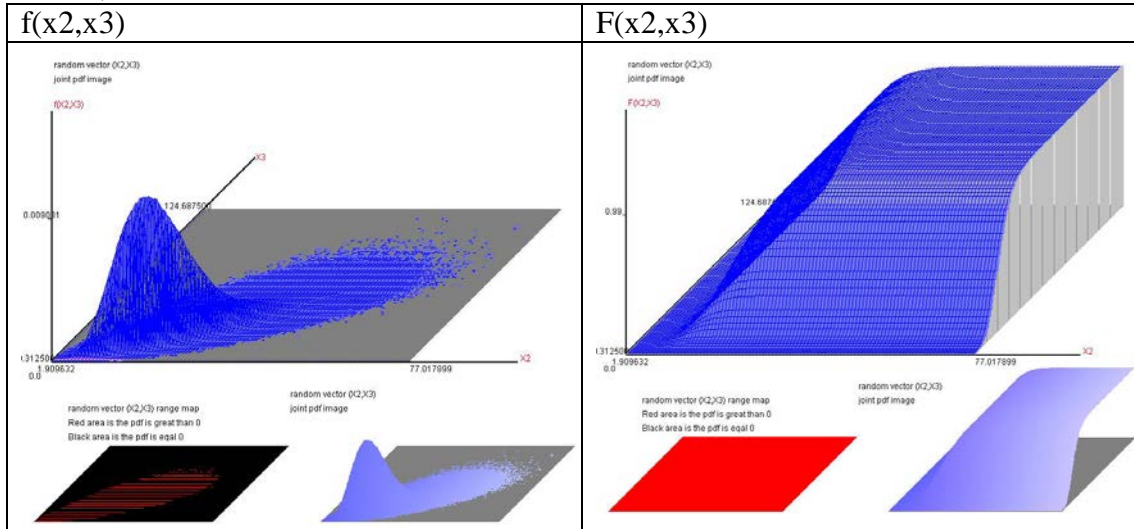
13.5.2)





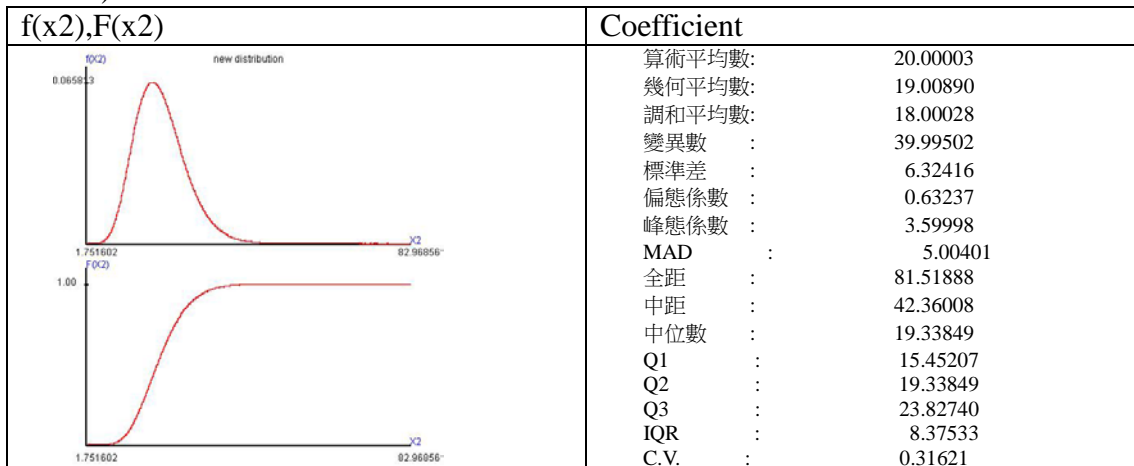


### 13.5.3)

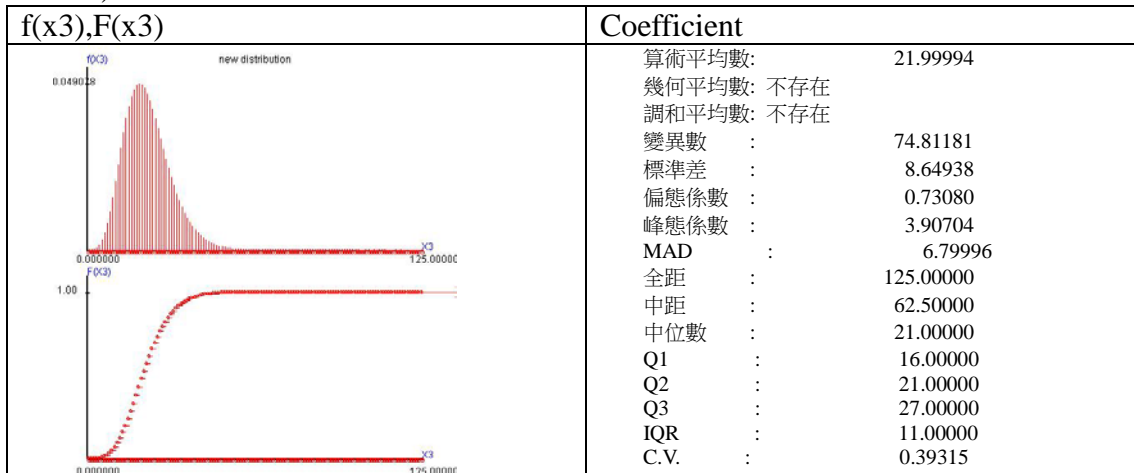


$E(X_2) = 20.0000$ ,  $Var(X_2) = 40.0034$   
 $E(X_3) = 22.0001$ ,  $Var(X_3) = 74.8193$   
 $Cov(X_2, X_3) = 44.0069$ ,  
 $X_2$  and  $X_3$  相關係數 = 0.8044.

### 13.5.4)



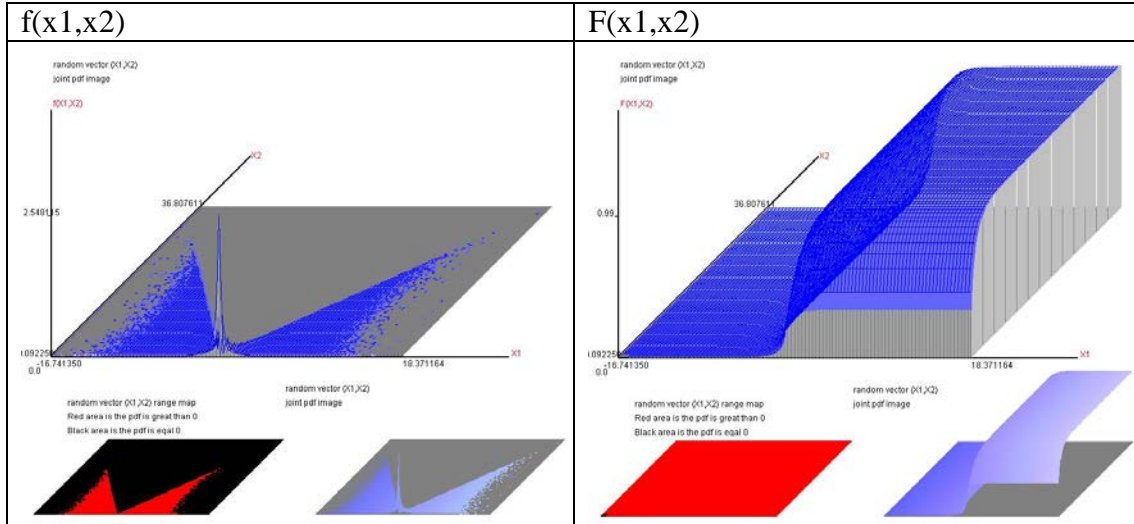
### 13.5.5)





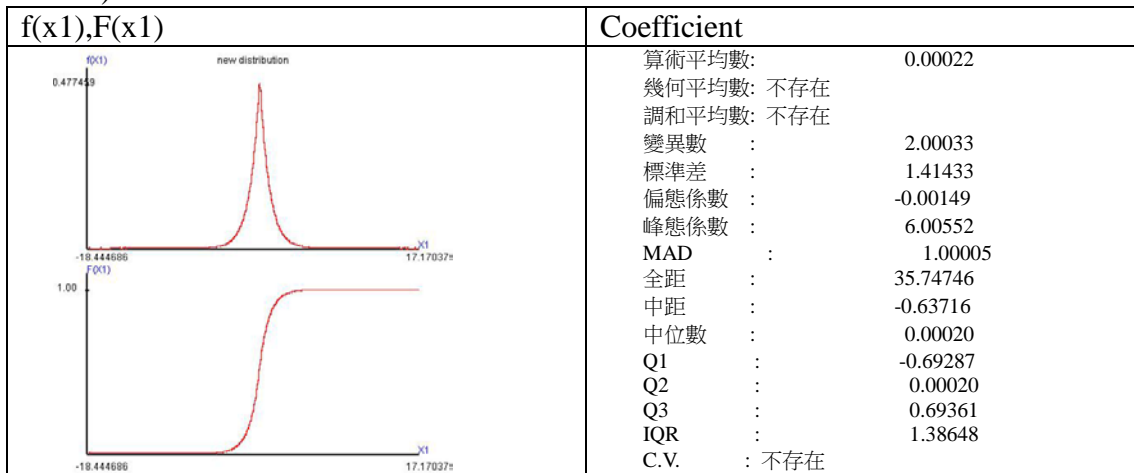
13.6)  $X_1 \sim DE(1,0), X_2 \sim \text{Arcsin}(\mu = |X_1|, c = |X_1|)$ ,

13.6.1)

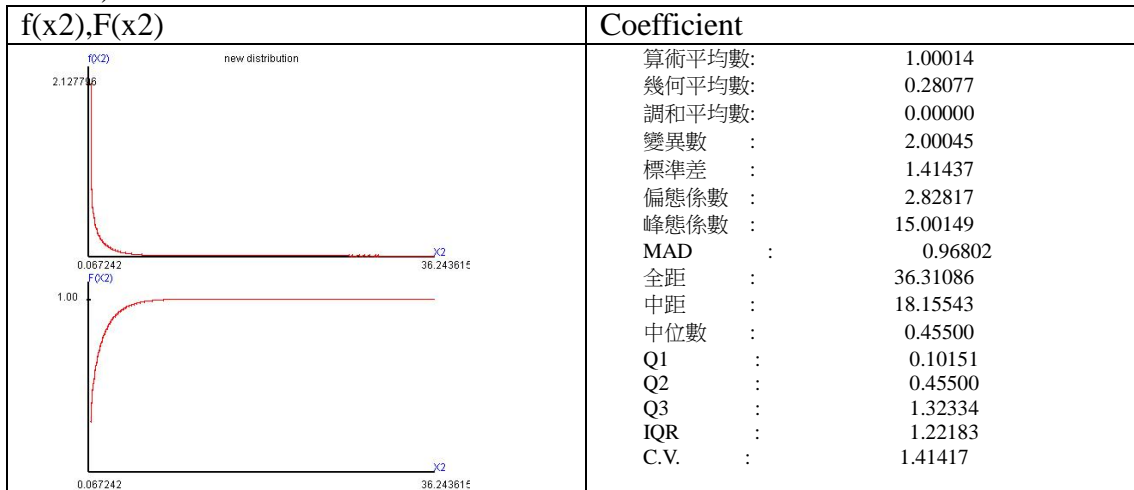


$E(X1)=$  0.0000,  $\text{Var}(X1)=$  1.9997  
 $E(X2)=$  1.0001,  $\text{Var}(X2)=$  2.0009  
 $\text{Cov}(X1,X2)=$  0.0002,  
 $X1$  and  $X2$  相關係數=0.0001.

13.6.2)



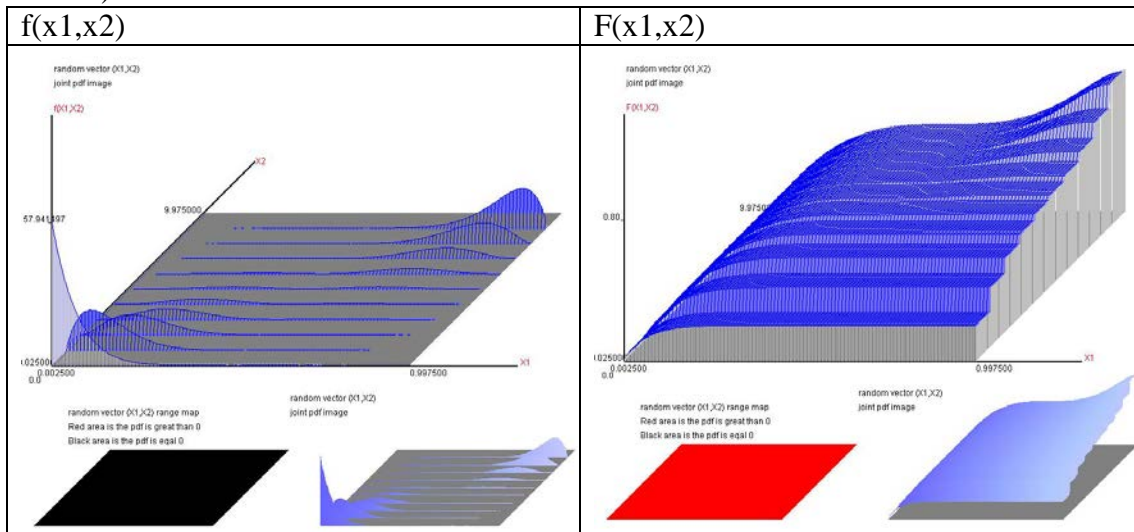
13.6.3)





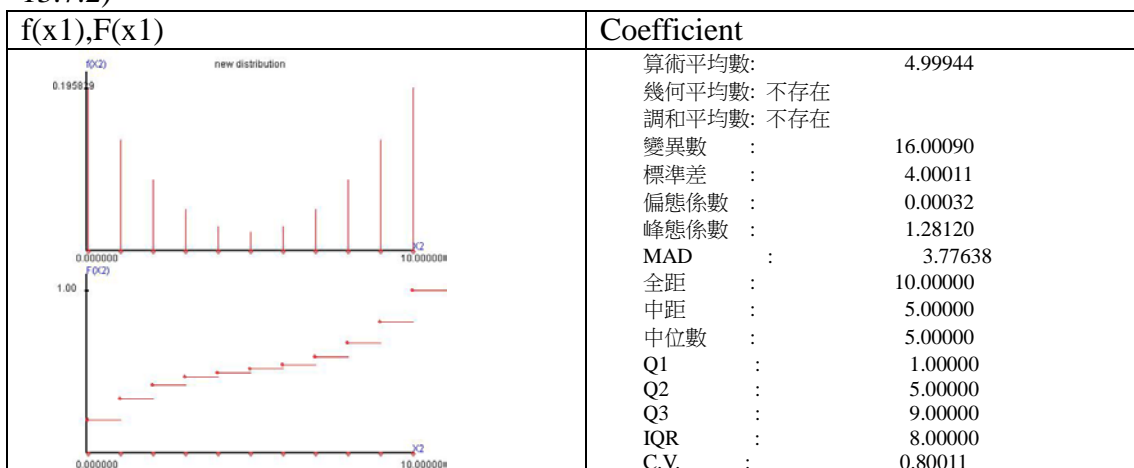
13.7)  $X_1 \sim U\_quadratic(0,1), X_2 \sim B(n=10, p = X_1),$

13.7.1)

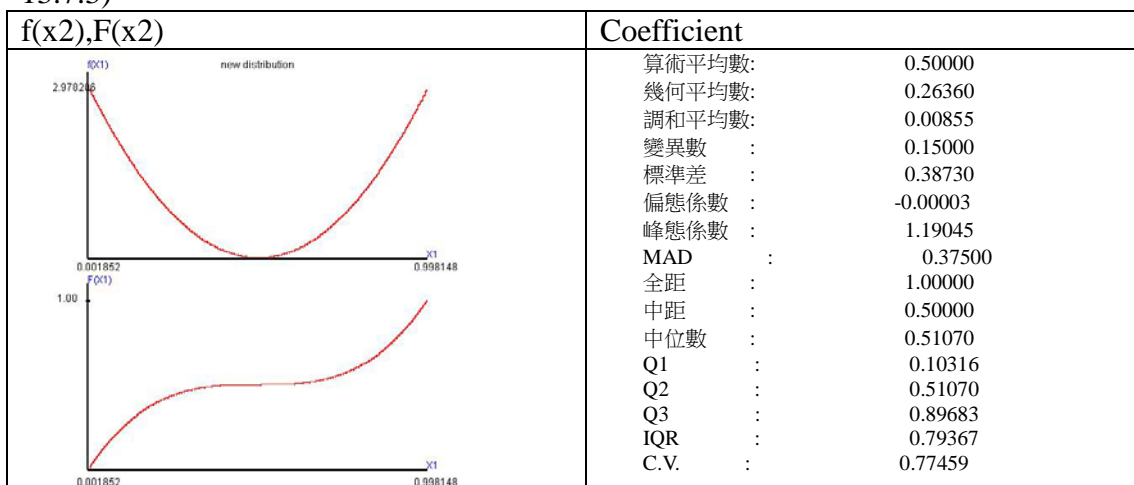


$E(X1)=$  0.5000,  $Var(X1)=$  0.1500  
 $E(X2)=$  5.0003,  $Var(X2)=$  16.0015  
 $Cov(X1,X2)=$  1.5001,  
 $X1$  and  $X2$  相關係數=0.9683.

13.7.2)



13.7.3)

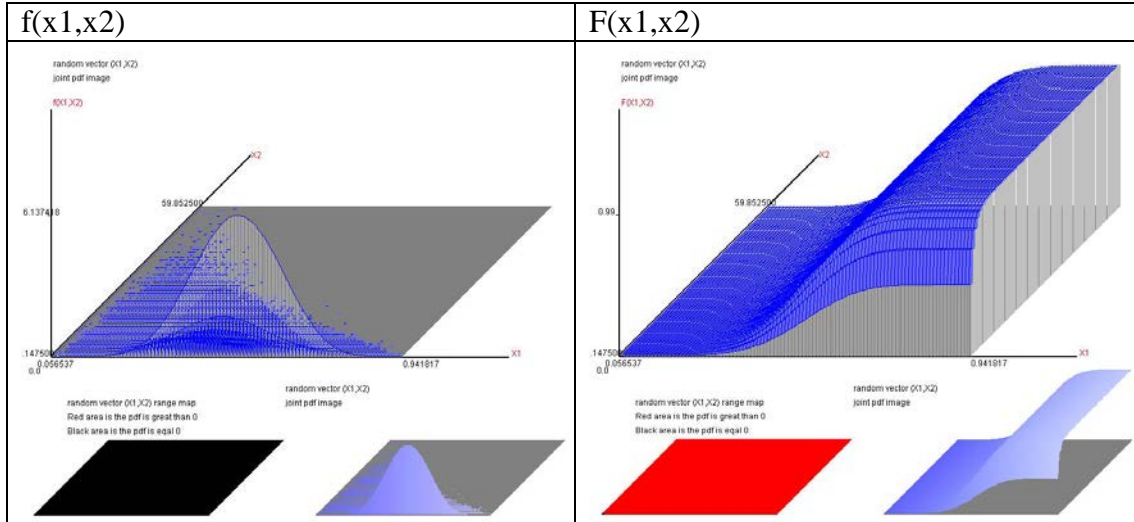






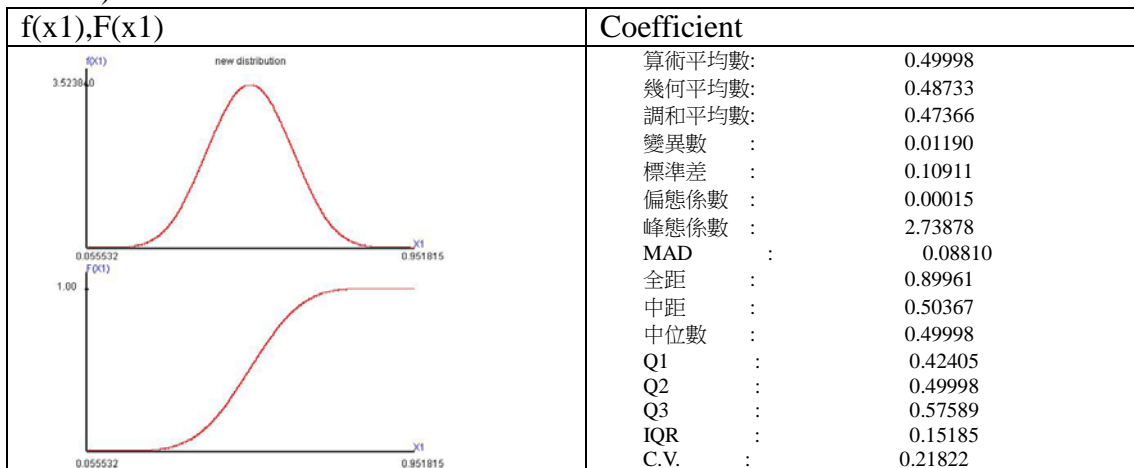
13.8)  $X_1 \sim \text{Beta}(10,10)$ ,  $X_2 \sim G(p = X_1)$ ,

13.8.1)

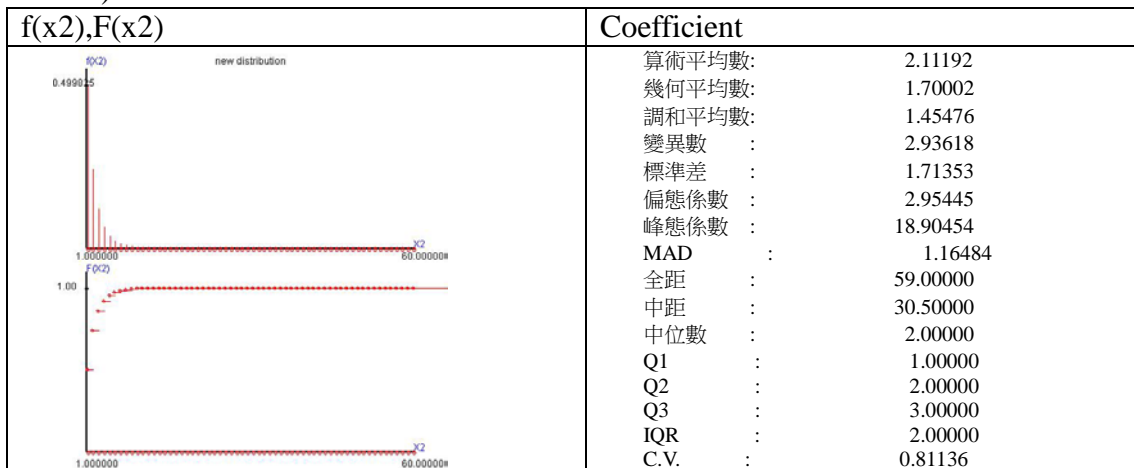


$E(X1)=$  0.5000,  $\text{Var}(X1)=$  0.0119  
 $E(X2)=$  2.1118,  $\text{Var}(X2)=$  2.9344  
 $\text{Cov}(X1,X2)=$  -0.0556,  
 $X1$  and  $X2$  相關係數=-0.2974.

13.8.2)



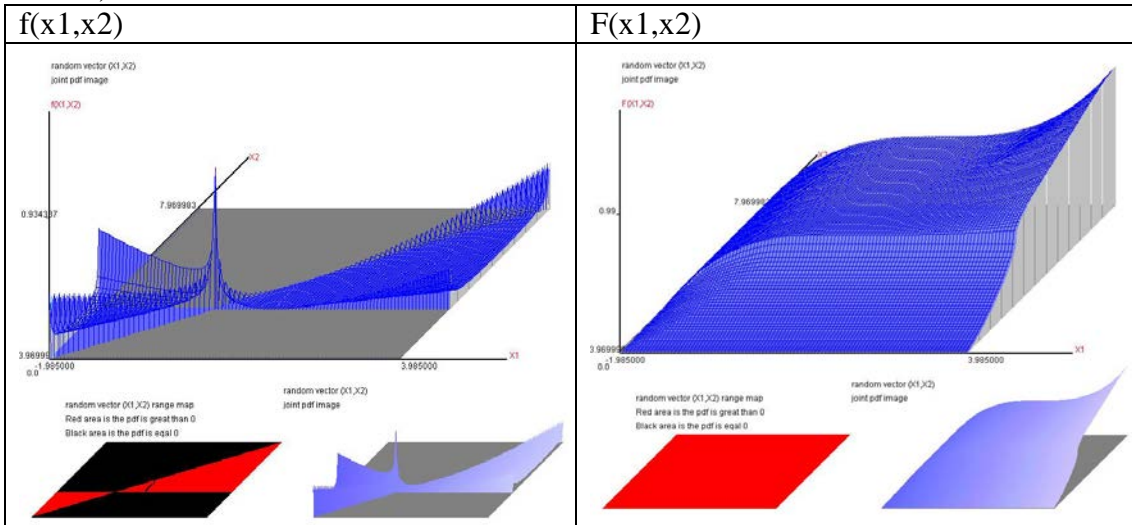
13.8.3)





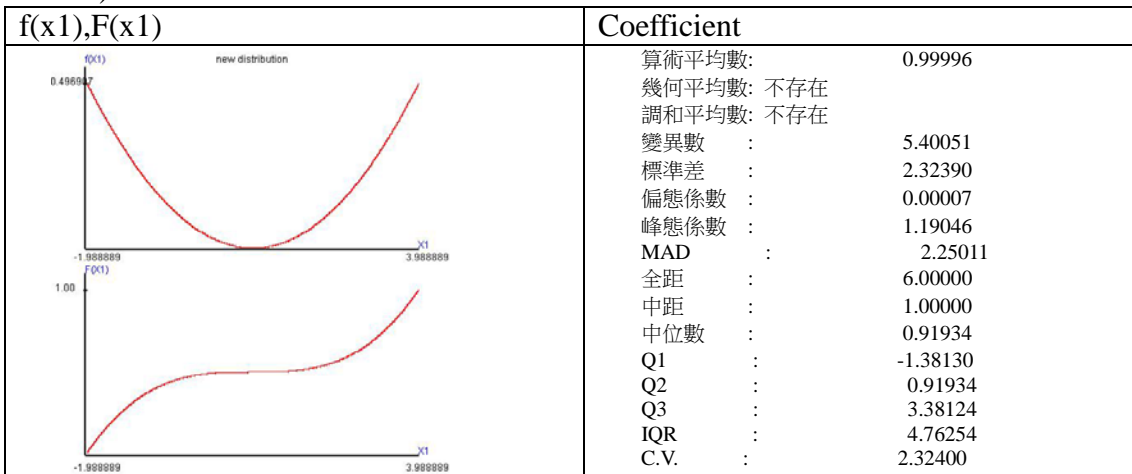
13.9)  $X_1 \sim U\_quadratic(-2,4), X_2 \sim Arc\sin(\mu = X_1, c = |X_1|)$ ,

13.9.1)



$E(X_1) = 1.0000$ ,  $Var(X_1) = 5.3998$   
 $E(X_2) = 1.0001$ ,  $Var(X_2) = 8.5996$   
 $Cov(X_1, X_2) = 5.3999$ ,  
 $X_1$  and  $X_2$  相關係數 = 0.7924.

13.9.2)



13.9.3)

