Actividad 2: A2-Matrices y vectores aleatorios

Code

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```
X = matrix(c(1,6,8,4,2,3,3,6,3), ncol =3)
b = matrix(c(8,14,14), ncol=1)
c = matrix(c(8,28,-42))
```

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```
cat("Media b'X =",mean(b[,1]),"\n")
```

```
Media b'X = 12
```

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```
cat("Media c'X =",mean(c[,1]),"\n\n")
```

```
Media c'X = -2
```

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```
cat("Varianza b'X =",var(b[,1]),"\n")
```

```
Varianza b'X = 12
```

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```
cat("Varianza c'X =",var(c[,1]),"\n\n")
```

```
Varianza c'X = 1300
```

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```
cat("Vector de medias de X =", colMeans(X),"\n\n")
```

```
Vector de medias de X = 5 3 4
```

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```
cat("Matriz de covarianza de X \n")
```

```
Matriz de covarianza de X
```

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```
print(cov(X))
```

```
     [,1] [,2] [,3]
[1,] 13.0 -2.5  1.5
[2,] -2.5  1.0 -1.5
[3,]  1.5 -1.5  3.0
```

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```
cat("\n Matriz de correlaciones de X \n")
```

```

 Matriz de correlaciones de X
```

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```
print(cor(X))
```

```
           [,1]       [,2]       [,3]
[1,]  1.0000000 -0.6933752  0.2401922
[2,] -0.6933752  1.0000000 -0.8660254
[3,]  0.2401922 -0.8660254  1.0000000
```

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```
cat("\n Determinante =", det(X))
```

```

 Determinante = 114
```

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```
library(MVN)
x = rnorm(100, 10, 2)
y = rnorm(100, 10, 2)
datos = data.frame(x,y)
mvn(datos, mvnTest = "hz", multivariatePlot = "persp")
```

```
$multivariateNormality
```

Test	HZ	p value	MVN
<chr>	<dbl>	<dbl>	<chr>
Henze-Zirkler	0.6092451	0.3738117	YES

1 row

```

$univariateNormality
```

	Test <S3: AsIs>	Variable <S3: AsIs>	Statistic <S3: AsIs>	p value <S3: AsIs>	Normality <S3: AsIs>
1	Anderson-Darling	x	0.4132	0.3319	YES
2	Anderson-Darling	y	0.4127	0.3327	YES

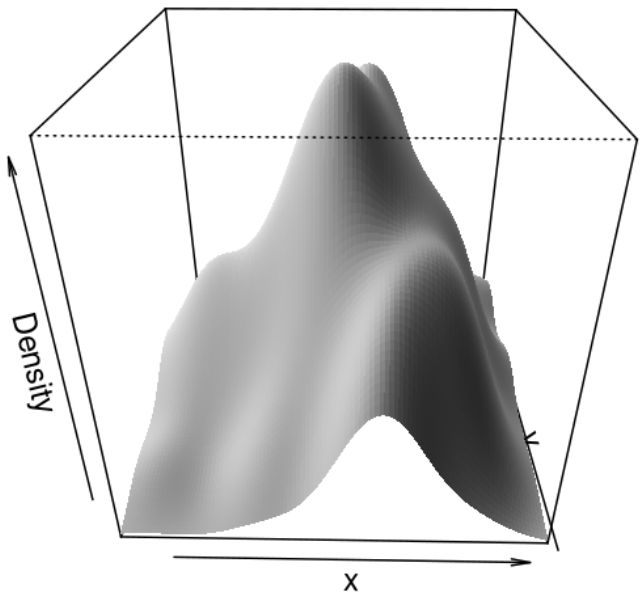
2 rows

```
$Descriptives
```

	n <int>	Mean <dbl>	Std.Dev <dbl>	Median <dbl>	Min <dbl>	Max <dbl>	25th <dbl>	75th <dbl>	Skew <dbl>
x 100	10.005470	2.042630	10.283532	4.758353	14.41744	8.710884	11.41252	-0.33777298	
y 100	9.997813	1.971105	9.953299	5.969003	13.64155	8.687783	11.62495	-0.04731483	

2 rows | 1-10 of 10 columns

```
NA
```



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```
mvn(datos, mvnTest = "hz", multivariatePlot = "contour")
```

```
$multivariateNormality
```

Test <chr>	HZ <dbl>	p value <dbl>	MVN <chr>

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1 row

```
$univariateNormality
```

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2 rows

```
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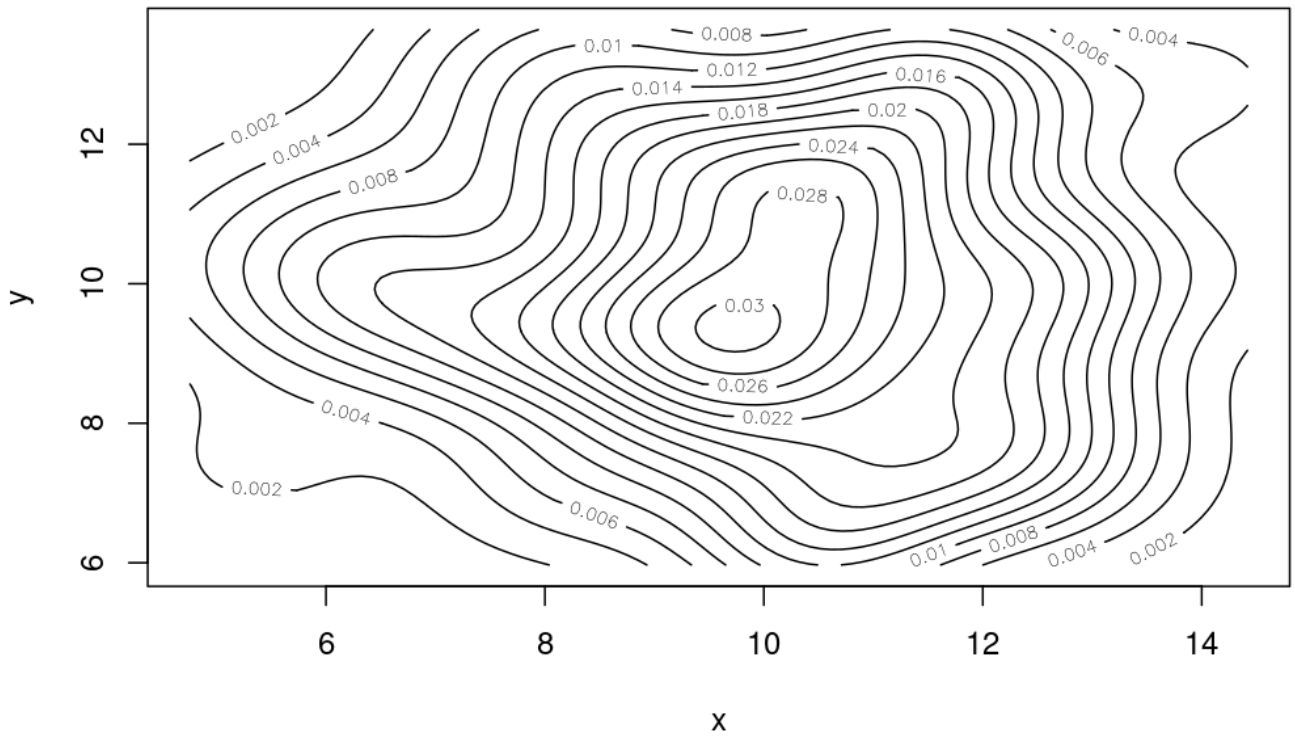
2 rows | 1-10 of 10 columns

```
NA
```



En este caso al aplicar la prueba de normalidad multivariada de Henze-Zirkler a X y Y se observa un p-value mayor a .05 por lo que se puede decir que tienen una normalidad multivariada en el nivel de significancia de .05

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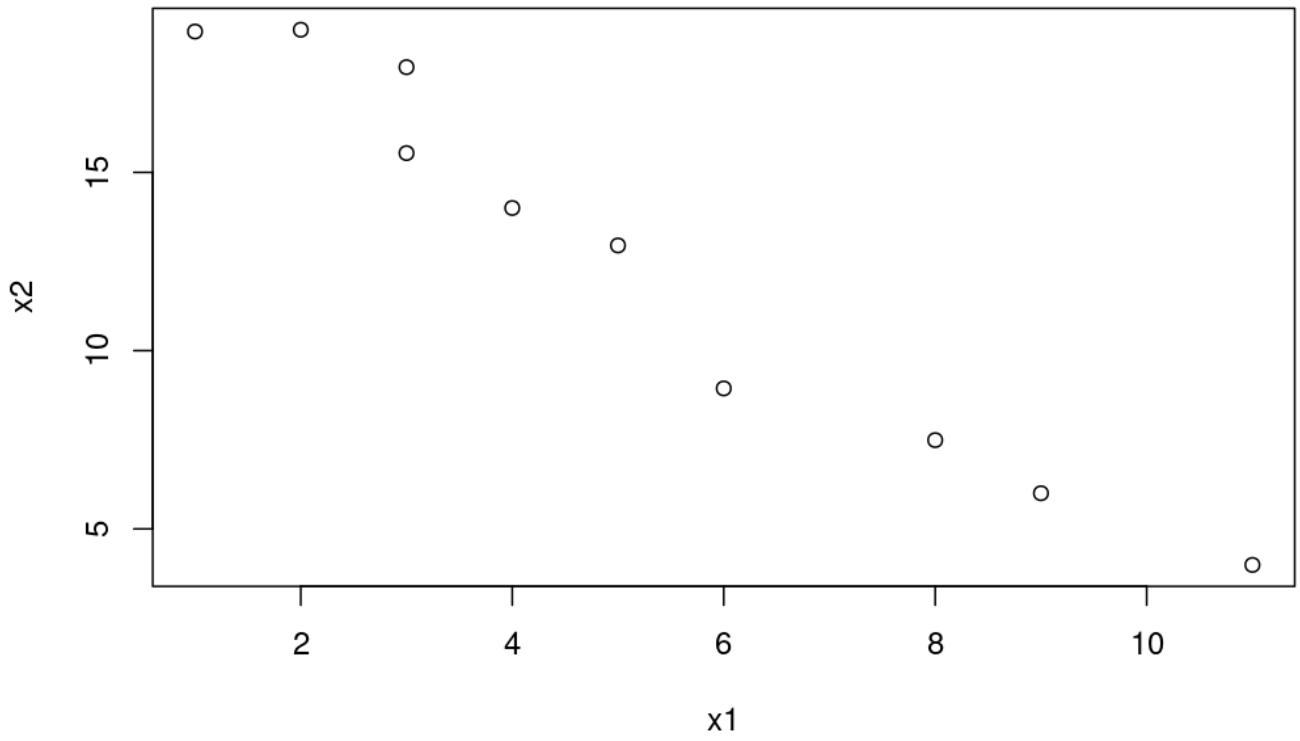
```
x1= c(1,2,3,3,4,5,6,8,9,11)
x2= c(18.95, 19.00, 17.95, 15.54, 14.00, 12.95, 8.94, 7.49, 6.00, 3.99)

plot(x1, x2)
```



La covarianza es negativa

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```
A = matrix(c(x1,x2), ncol =2)
distancias = mahalanobis(A,mean(A),cov(A))
distancias
```

```
 [1] 12.405051  5.574686  3.508886
 [4] 10.170426  8.594036  5.354751
 [7] 16.965340  5.775439  4.999457
[10]  1.616989
```

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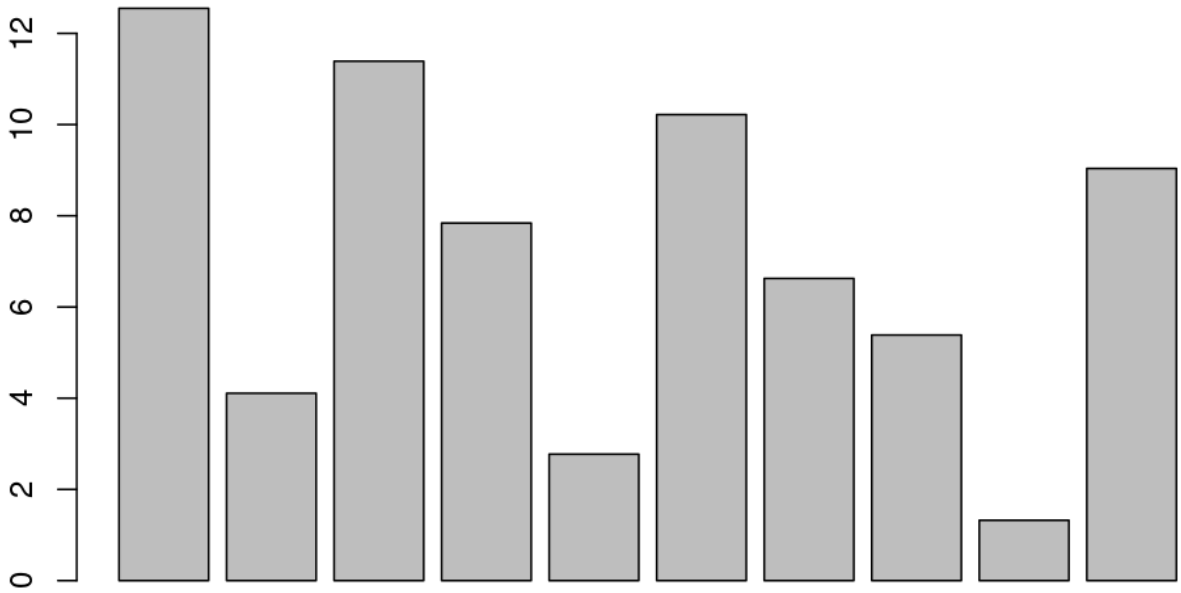
```
distanciasOrdenadas = order(distancias)
barplot(qchisq(.75, df=distanciasOrdenadas))
```


0
2
4
6
8
10
12