

HUDM6026 Homework_04

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PART 01: Homework 03's Solution

Step 1, input the given variance-covariance matrix; Note, since these ten variables follow the standard normal distribution, the values in correlation matrix is same to the value in var-cov matrix.

```
> library(mvtnorm)
> cov = matrix(c(1,0,0,0,0.2,0,0,0,0,0,
+               0,1,0,0,0,0.9,0,0,0,0,
+               0,0,1,0,0,0,0.2,0,0,
+               0,0,0,1,0,0,0,0.9,0,
+               0.2,0,0,0,1,0,0,0,0,0,
+               0,0.9,0,0,0,1,0,0,0,0,
+               0,0,0,0,0,0,1,0,0,0,
+               0,0,0.2,0,0,0,0,1,0,0,
+               0,0,0,0.9,0,0,0,0,1,0,
+               0,0,0,0,0,0,0,0,0,1),10,10)
> # randomly generate one row of data to test this matrix
> # X <- rmvnorm(1,sigma = cov) # looking good
```

Step 2, write a function to generate 500 observations

```
> dat_gen <- function(n, cov){
+   return(rmvnorm(n, mean=rep(0,10), sigma=cov))}
> s1 <- dat_gen(500, cov)
> head(s1) # looking good
```

	[,1]	[,2]	[,3]	[,4]	[,5]	[,6]
[1,]	-1.4495647	2.4304171	-0.5550750	-1.7774593	-2.28458843	2.5885841
[2,]	-1.5535961	-0.9980552	-0.2887975	0.1971154	-0.58816164	-0.3058877
[3,]	0.5264633	-0.7758964	1.0103404	-0.3780678	-0.35108755	-0.8565865
[4,]	2.0188461	-1.4394062	1.1914730	-1.9042487	-0.49660141	-1.2617427
[5,]	0.4331412	-1.0096178	1.9452516	-0.1053070	0.08668391	-1.1676213
[6,]	-0.6843456	-1.5652379	0.2742782	0.5308587	0.63274537	-0.5509560

	[,7]	[,8]	[,9]	[,10]
[1,]	-0.01079033	0.6198942	-1.54020439	1.35558351
[2,]	0.18792892	-1.3272023	-0.06897668	-1.67448711
[3,]	0.88319683	-1.4548352	-0.16851130	0.79565520
[4,]	0.51101058	0.6041980	-1.96296845	-1.20586395
[5,]	0.04052240	-0.3339130	-0.34540695	-0.82768851
[6,]	-0.09529678	-0.5981320	1.13041165	-0.04900414

Step 3, dicotormize the 1st, 3rd, 5th, 6th, 8th, and 9th variable within a for-loop.

```

> for (i in c(1,3,5,6,8,9)) {
+   s1[,i] <- ifelse(s1[,i] > mean(s1[,i]), 1, 0)
+ }
> head(s1)
      [,1]      [,2] [,3]      [,4] [,5] [,6]      [,7] [,8] [,9]
[1,]    0  2.4304171    0 -1.7774593    0    1 -0.01079033    1    0
[2,]    0 -0.9980552    0  0.1971154    0    0  0.18792892    0    0
[3,]    1 -0.7758964    1 -0.3780678    0    0  0.88319683    0    0
[4,]    1 -1.4394062    1 -1.9042487    0    0  0.51101058    1    0
[5,]    1 -1.0096178    1 -0.1053070    1    0  0.04052240    0    0
[6,]    0 -1.5652379    1  0.5308587    1    0 -0.09529678    0    1
      [,10]
[1,]  1.35558351
[2,] -1.67448711
[3,]  0.79565520
[4,] -1.20586395
[5,] -0.82768851
[6,] -0.04900414

```