

HW5

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Problem 5

Part b

```
n = 12
d = 2

V = rep(0,d)
N = matrix(0,d,d)
B = matrix(0,d,d)
for(i in 1:d){
  V[i] = rchisq(1,n-i+1)
  for(j in 1:d){
    N[i,j] = rnorm(1)
    if(i == j){
      B[i,j] = V[i] + sum(N[1:i-1,i]^2)
      B[j,i] = B[i,j]
    }
    if(j > i){
      B[i,j] = N[i,j]*sqrt(V[i]) + sum(N[1:i-1,i]*N[1:i-1,j])
      B[j,i] = B[i,j]
    }
  }
}
B
```

```
##           [,1]      [,2]
## [1,] 6.665597 0.858232
## [2,] 0.858232 11.936733
```

Thus, under this scheme, B would be a simulated draw from the Wishart(2,12).

Part b

```
y1 = c(1,1,-1,-1,2,2,-2,-2,NA,NA,NA,NA)
y1.obs = y1[!is.na(y1)]
y2 = c(1,-1,1,-1,NA,NA,NA,NA,2,2,-2,-2)
y2.obs = y2[!is.na(y2)]
y1.comp = y1[1:4]
y2.comp = y2[1:4]

data = cbind(y1,y2)

data.complete = cbind(y1.comp,y2.comp)
S.complete = t(data.complete) %*% data.complete
```

```

n.comp = 4

for(i in 1:1000){
  # Steps
  ## Sample Sigma using our previous function
  sigm.comp = rWishart(1,n.comp,S.complete)
  ## Calculate rho,sigma1,sigma2
  rho = sigm.comp[1,2] / sqrt(sigm.comp[1,1]*sigm.comp[2,2])

  ## Impute missing data
  y.mis.1 = NULL
  for(i in 9:12){
    y.mis.1 = c(y.mis.1,rnorm(1,sigm.comp[1,2] / (sigm.comp[1,1] * (data[i,2])),sd = sqrt(sigm.comp[1,1] * (data[i,2]^2))))

    y.mis.2 = NULL
    for(i in 5:8){
      y.mis.2 = c(y.mis.2, rnorm(1,sigm.comp[1,2] / (sigm.comp[2,2] * (data[i,1])),sd = sqrt(sigm.comp[2,2] * (data[i,1]^2))))
    }
  }
  full.data = data
  full.data[5:8,2] = y.mis.2
  full.dat[9:12,1] = y.mis.1
  ## Evaluate the weights
}

```

I couldn't finish the weights part. If I would have continued. I would have evaluated the data under the instrumental and target distributions, and then estimate ρ using the weighted values.

Part D

I couldn't finish this part.