Exercise-4.R

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### Exercise 4  
  
remove(list = ls())  
  
e = c(1,0,-1,2)  
e

## [1] 1 0 -1 2

s = c(1,0.2,0.4,-0.5,0.2,2,0.8,0,0.4,0.8,2,0,-0.5,0,0,1)  
S = matrix(s,4,4)  
S

## [,1] [,2] [,3] [,4]  
## [1,] 1.0 0.2 0.4 -0.5  
## [2,] 0.2 2.0 0.8 0.0  
## [3,] 0.4 0.8 2.0 0.0  
## [4,] -0.5 0.0 0.0 1.0

x1 = c(0,0,0,0)  
x2 = c(1,1,1,1)  
x3 = c(1,0,1,0)  
  
# a)  
# i)  
  
denx1 = (1/(((2\*pi)^(4/2))\*sqrt(det(S))))\*exp((-0.5)\*(t(x1-e)%\*%solve(S)%\*%(x1-e)))  
denx1

## [,1]  
## [1,] 4.705344e-05

# ii)  
  
denx2 = (1/(((2\*pi)^(4/2))\*sqrt(det(S))))\*exp((-0.5)\*(t(x2-e)%\*%solve(S)%\*%(x2-e)))  
denx2

## [,1]  
## [1,] 0.00202044

# iii)  
  
denx3 = (1/(((2\*pi)^(4/2))\*sqrt(det(S))))\*exp((-0.5)\*(t(x3-e)%\*%solve(S)%\*%(x3-e)))  
denx3

## [,1]  
## [1,] 0.0001671811

# b)   
  
# i)  
  
(1/(((2\*pi)^(4/2))\*sqrt(det(S))))\*exp((-0.5)\*(qchisq(0.95,4)))

## [1] 0.0001470645

# ii)  
  
(1/(((2\*pi)^(4/2))\*sqrt(det(S))))\*exp((-0.5)\*(qchisq(0.9,4)))

## [1] 0.000345508

# iii)  
  
(1/(((2\*pi)^(4/2))\*sqrt(det(S))))\*exp((-0.5)\*(qchisq(0.8,4)))

## [1] 0.0008459224