

```
## Observatons are written below each plot
```

```
print("Observatons are written below each plot")
```

```
## [1] "Observatons are written below each plot"
```

```
cancerreactor=read.table("http://www.stat.washington.edu/hoff/Book/Data/hwdata/cancer_react.dat",header=T)
#data for cancer affected people near reactors
cancernoreactor=read.table("http://www.stat.washington.edu/hoff/Book/Data/hwdata/cancer_noreact.dat",header=T)
#data for cancer affected people not near reactors

#

#Part ???B

#Posterior distribution of theta_one

n1=length(cancerreactor$x)
y1sum=sum(cancerreactor$y)
x1sum=sum(cancerreactor$x)

#Posterior distribution is Gamma(a1+256,b1+95)

#Posterior distribution of theta_two

n2=length(cancernoreactor$x)
y2sum=sum(cancernoreactor$y)
x2sum=sum(cancernoreactor$x)

#Posterior distribution is Gamma (a2+2285,b2+1037)

#####

#Part???C

parameterscalc=function(a1,b1,a2,b2,opinion)
{

print(opinion)
posta1=a2+256
postb1=b2+95
posta2=a1+2285
postb2=b1+1037
meanthetaone=posta1/postb1
meanthetatwo=posta2/postb2
```

```

print(paste("Posterior Mean of near reactor given data is",meanthetaone))
print(paste("Posterior Mean of not near reactor given data is",meanthetatwo))
#posterior mean calculations

quantiletwo=qgamma(c(.025,.975),posta2,postb2)
print("95% quantile based posterior interval for not near reactor")
print(quantiletwo)
quantileone=qgamma(c(.025,.975),posta1,postb1)
print("95% quantile based posterior interval for near reactor")
print(quantileone)
#Posterior mean calculation
mcsampleone=rgamma(10000,posta1,postb1)
mcsampletwo=rgamma(10000,posta2,postb2)
#generate MonteCarlo samples
print(paste("Pr(theta2>theta1|data)is",mean(mcsampleone>
mcsampletwo)))
theta=seq(0.005,5.00,length=5000)
densityone=dgamma(theta,posta1,postb1)
densitytwo=dgamma(theta,posta2,postb2)

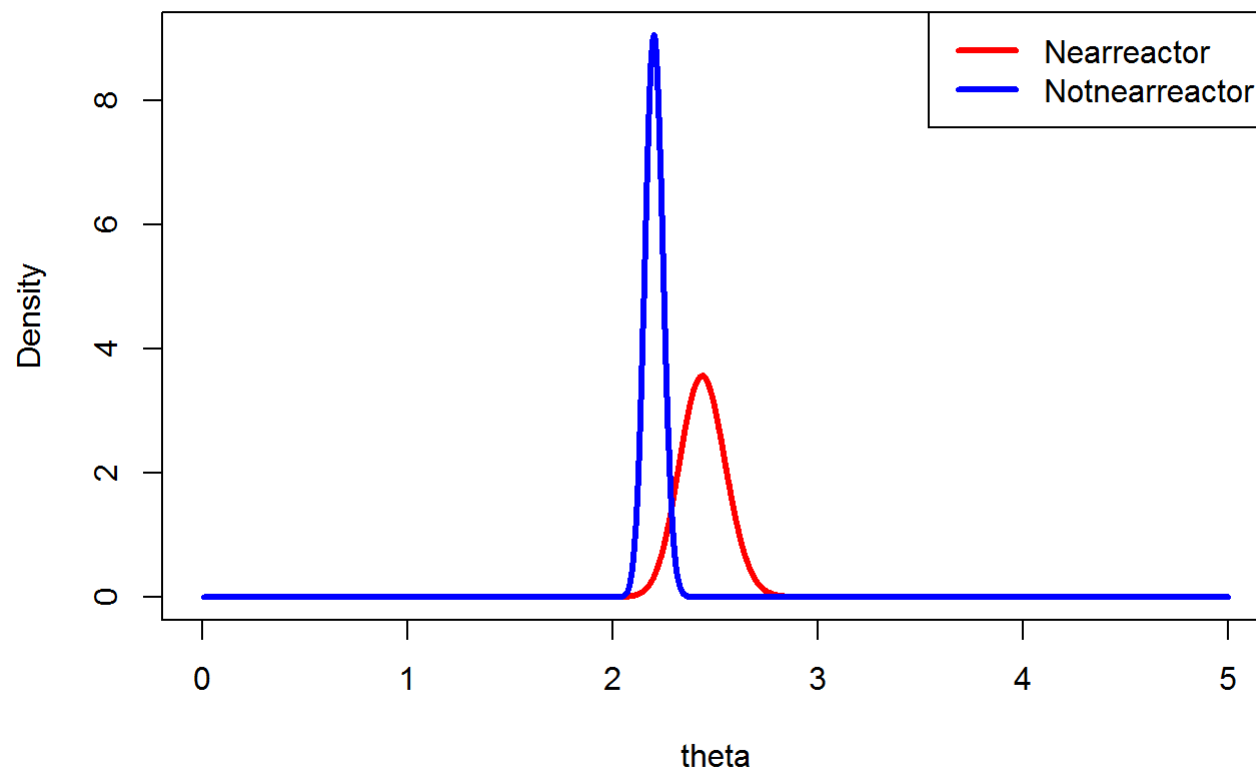
plot(theta,densityone,type="l",ylab="Density",lty=1,
lwd=3,main=paste("Posterior densities when a1,b1,a2,b2 are",a1,b1,a2,b2),col="red",ylim=c(min(densityone,densitytwo),max(densityone,densitytwo)))
lines(theta,densitytwo,lty=1,lwd=3,col="blue")
legend("topright",c("Nearreactor", "Notnearreactor"),lty=c(1,1),lwd=c(3,3),col=c("red","blue"))

}
# C-1
a1=a2=2.2*100
b1=b2=100
parameterscalc(a1,b1,a2,b2,"OPINION ONE")

```

```
## [1] "OPINION ONE"  
## [1] "Posterior Mean of near reactor given data is 2.44102564102564"  
## [1] "Posterior Mean of not near reactor given data is 2.20316622691293"  
## [1] "95% quantile based posterior interval for not near reactor"  
## [1] 2.117726 2.290273  
## [1] "95% quantile based posterior interval for near reactor"  
## [1] 2.226633 2.665131  
## [1] "Pr(theta2>theta1|data)is 0.98"
```

Posterior densities when a1,b1,a2,b2 are 220 100 220 100



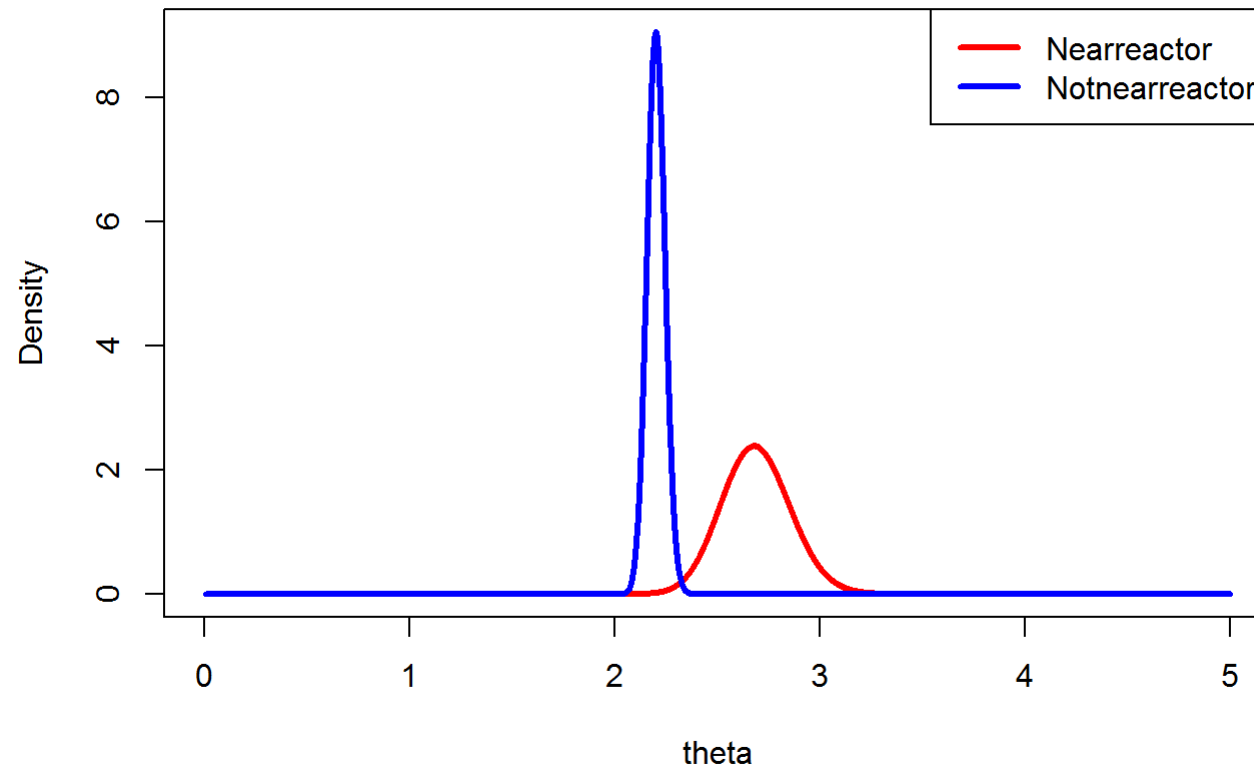
```
print(" From the graph we can see that the opinion stated is not true because only the cancer rate not near reactor matches  
with the previous year rates. ")
```

```
## [1] " From the graph we can see that the opinion stated is not true because only the cancer rate not near reactor matches with the previous year rates. "
```

```
# C-2  
a1=2.2*100  
b1=100  
a2=2.2  
b2=1  
parameterscalc(a1,b1,a2,b2,"OPINION TWO")
```

```
## [1] "OPINION TWO"  
## [1] "Posterior Mean of near reactor given data is 2.68958333333333"  
## [1] "Posterior Mean of not near reactor given data is 2.20316622691293"  
## [1] "95% quantile based posterior interval for not near reactor"  
## [1] 2.117726 2.290273  
## [1] "95% quantile based posterior interval for near reactor"  
## [1] 2.371497 3.027397  
## [1] "Pr(theta2>theta1jdata)is 0.9986"
```

Posterior densities when a1,b1,a2,b2 are 220 100 2.2 1



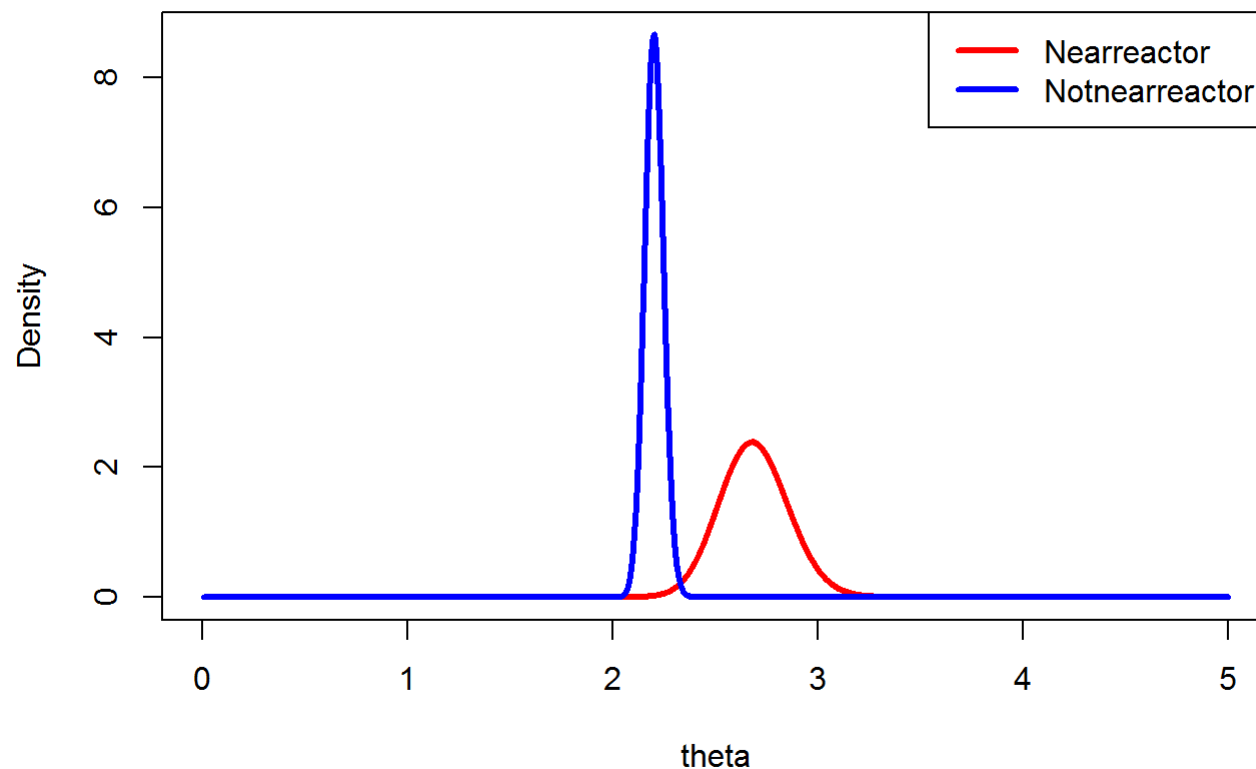
```
print("From the graph we can say that the opinion is true because the cancer rate matches for nonreactor counties and previous year and almost close for reactor counties.")
```

```
## [1] "From the graph we can say that the opinion is true because the cancer rate matches for nonreactor counties and previous year and almost close for reactor counties."
```

```
# C-3  
a1=a2=2.2  
b1=b2=1  
parameterscalc(a1,b1,a2,b2,"OPINION THREE")
```

```
## [1] "OPINION THREE"
## [1] "Posterior Mean of near reactor given data is 2.68958333333333"
## [1] "Posterior Mean of not near reactor given data is 2.20346820809249"
## [1] "95% quantile based posterior interval for not near reactor"
## [1] 2.114081 2.294680
## [1] "95% quantile based posterior interval for near reactor"
## [1] 2.371497 3.027397
## [1] "Pr(theta2>theta1|data)is 0.9983"
```

Posterior densities when a1,b1,a2,b2 are 2.2 1 2.2 1



```
print("The opinion stated here is false since there is a match in the cancer rate of previous year with the nonreactor count  
ies.")
```

```
## [1] "The opinion stated here is false since there is a match in the cancer rate of previous year with the nonreactor counties."
```