

# Final 37810

*Shiting Zhu, Lijing Wang, Jingting Li*

*November 1, 2015*

## Question 1

### Gibbs Sampling

```
Gibbs_<-function(x0,y0,iterations,B=5,burnIn=0)
## 5 parameters are needed in this function, with B=5 and burnIn=0 by default
{
  if(x0>0&& x0<B&&y0>0&&y0<B)
  ## to check whether the starting values are in the domain.
  {
    x<-c(x0,rep(NA,iterations-1))
    ## Initialize the Markov chain
    y<-c(y0,rep(NA,iterations-1))
    ## Initialize the Markov chain
    for(i in 1:(iterations-1))
    {
      x[i+1]<-(-log(1-runif(1)*(1-exp(-y[i]*B)))/y[i])
      ## use inverse transform sampling to draw sample from conditional distribution
      ##  $p(x^{i+1}|y^i)$ 
      y[i+1]<-(-log(1-runif(1)*(1-exp(-x[i+1]*B)))/x[i+1])
      ## use inverse transform sampling to draw sample from conditional distribution
      ##  $p(y^{i+1}|x^{i+1})$ 
    }
    if(burnIn>0)
    {
      x<-x[-(1:burnIn)]
      y<-y[-(1:burnIn)]
      print(length(x))
    }
    ## discard the first bunch of draws for the burn-in process
    return(data.frame(x,y))
  }
  else
  stop("Initial values incorrect")
  ## print the information for incorrect starting values
}
```