Gibbs sampler : example

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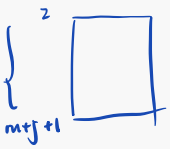
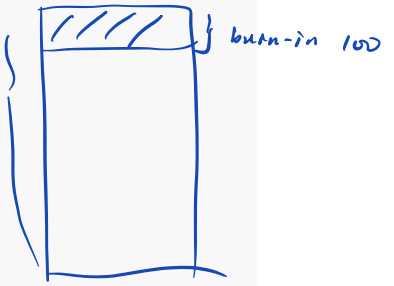
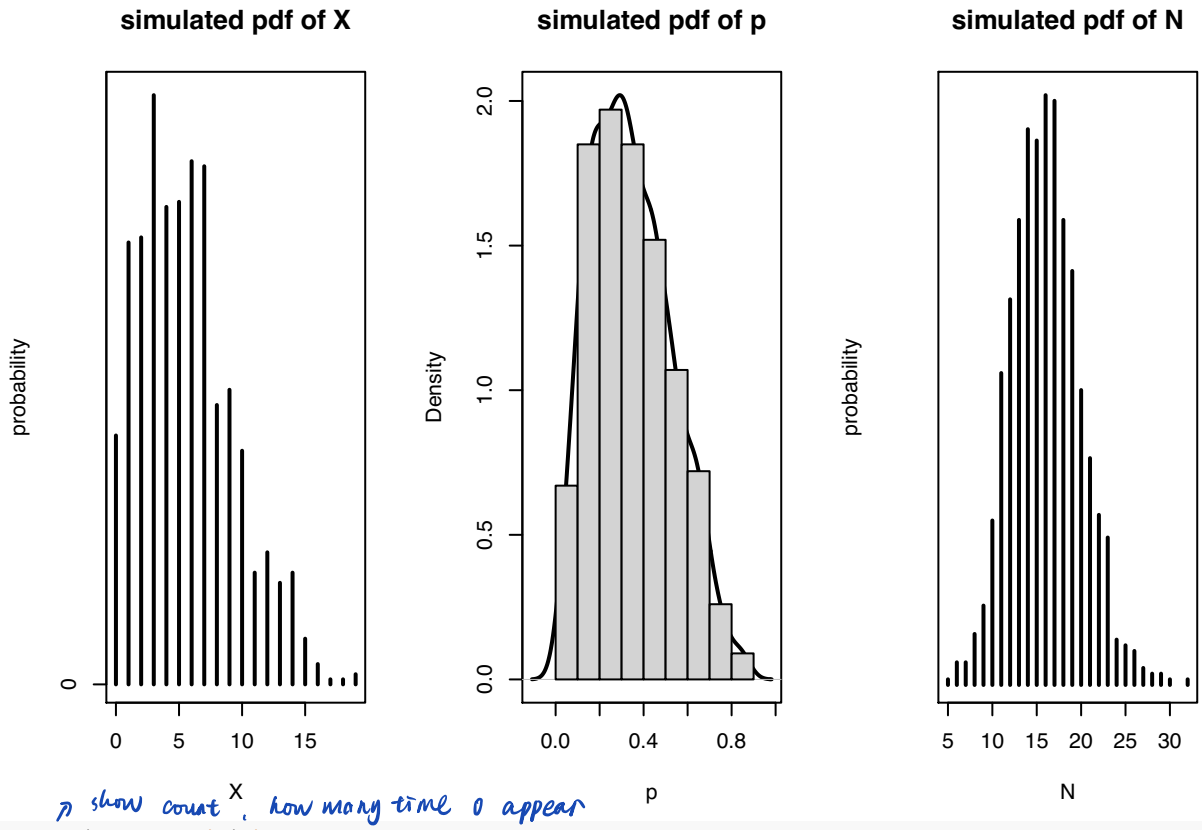
```r
# Method for generating J samples of (x,p,N) values by the Gibbs sampler.
# In total m+J samples are generated but the first m are discarded.
# (x0,p0,N0) is the initial value
# If (x0,p0,N0) is not given, one can use x0=rbinom(1,16, 0.5), p0=rbeta(1,2,4)
# and N0=rpois(1,16) to generate it.
gibbs.f2=function(x0, p0, N0, J, m){
    x.seq <- p.seq <- N.seq <- rep(-1, J+m+1)
    x.seq[1] <- x0
    p.seq[1] <- p0
    N.seq[1] <- N0
    for(j in 2:(J+m+1)) {
            x.seq[j] <- rbinom(1, N.seq[j-1], p.seq[j-1])
            p.seq[j] <- rbeta(1, (x.seq[j] + 2), (N.seq[j-1] - x.seq[j] + 4))
            N.seq[j] <- rpois(1, 16 * (1 - p.seq[j])) + x.seq[j]
        }
    result <- list(X = x.seq[(m+2):(J+m+1)], p = p.seq[(m+2):(J+m+1)], N = N.seq[(m+2):(J+m+1)])
    result
}

set.seed(456)
J=1000
gibbsam2=gibbs.f2(8, 0.5, 16, J, 100)
par(mfrow=c(1,3))
plot(sort(unique(gibbsam2$X)), table(gibbsam2$X)/J, type='h',xlab="X",
     ylab="probability", lwd=2,main="simulated pdf of X")
plot(density(gibbsam2$p), main="simulated pdf of p", xlab="p", lwd=2)
hist(gibbsam2$p, freq=F, add=T)
plot(sort(unique(gibbsam2$N)), table(gibbsam2$N)/J, type='h',xlab="N",
     ylab="probability", lwd=2,main="simulated pdf of N")
```







show count, how many time 0 appear

```
table(gibbsam2$X)/J
```

compute the frequency

```
##
##     0     1     2     3     4     5     6     7     8     9    10    11    12
## 0.049 0.087 0.088 0.116 0.094 0.095 0.103 0.102 0.055 0.058 0.046 0.022 0.026
##    13    14    15    16    17    18    19
## 0.020 0.022 0.009 0.004 0.001 0.001 0.002
```

```
table(gibbsam2$N)/J
```

```
##
##     5     6     7     8     9    10    11    12    13    14    15    16    17
## 0.001 0.004 0.004 0.009 0.014 0.029 0.055 0.068 0.082 0.098 0.096 0.104 0.103
##    18    19    20    21    22    23    24    25    26    27    28    29    30
## 0.082 0.073 0.052 0.040 0.030 0.026 0.008 0.007 0.006 0.003 0.002 0.002 0.001
##    32
## 0.001
```