FET Bayesian Methods - HW3 - 7751512

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Question 1

```
##
## Starting Gibbs Sampler for Binary Probit Model
##    with  100  observations
## Table of y Values
## y
##  0  1
## 51 49
##
## Prior Parms:
## betabar
## [1] 0 0 0
## A
##      [,1] [,2] [,3]
## [1,] 0.01 0.00 0.00
## [2,] 0.00 0.01 0.00
## [3,] 0.00 0.00 0.01
##
## MCMC parms:
## R=  50000  keep=  1  nprint=  100
##
##  MCMC Iteration (est time to end - min)
##  100 (0.0)
##  200 (0.0)
##  300 (0.0)
##  400 (0.0)
##  500 (0.0)
##  600 (0.0)
##  700 (0.0)
##  800 (0.0)
##  900 (0.0)
##  1000 (0.0)
##  1100 (0.0)
##  1200 (0.0)
##  1300 (0.0)
##  1400 (0.0)
##  1500 (0.0)
##  1600 (0.0)
##  1700 (0.0)
##  1800 (0.0)
##  1900 (0.0)
##  2000 (0.0)
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##  2100 (0.0)
##  2200 (0.0)
##  2300 (0.0)
##  2400 (0.0)
##  2500 (0.0)
##  2600 (0.0)
##  2700 (0.0)
##  2800 (0.0)
##  2900 (0.0)
##  3000 (0.0)
##  3100 (0.0)
##  3200 (0.0)
##  3300 (0.0)
##  3400 (0.0)
##  3500 (0.0)
##  3600 (0.0)
##  3700 (0.0)
##  3800 (0.0)
##  3900 (0.0)
##  4000 (0.0)
##  4100 (0.0)
##  4200 (0.0)
##  4300 (0.0)
##  4400 (0.0)
##  4500 (0.0)
##  4600 (0.0)
##  4700 (0.0)
##  4800 (0.0)
##  4900 (0.0)
##  5000 (0.0)
##  5100 (0.0)
##  5200 (0.0)
##  5300 (0.0)
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##  5700 (0.0)
##  5800 (0.0)
##  5900 (0.0)
##  6000 (0.0)
##  6100 (0.0)
##  6200 (0.0)
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##  6600 (0.0)
##  6700 (0.0)
##  6800 (0.0)
##  6900 (0.0)
##  7000 (0.0)
##  7100 (0.0)
##  7200 (0.0)
##  7300 (0.0)
##  7400 (0.0)
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##  7500 (0.0)
##  7600 (0.0)
##  7700 (0.0)
##  7800 (0.0)
##  7900 (0.0)
##  8000 (0.0)
##  8100 (0.0)
##  8200 (0.0)
##  8300 (0.0)
##  8400 (0.0)
##  8500 (0.0)
##  8600 (0.0)
##  8700 (0.0)
##  8800 (0.0)
##  8900 (0.0)
##  9000 (0.0)
##  9100 (0.0)
##  9200 (0.0)
##  9300 (0.0)
##  9400 (0.0)
##  9500 (0.0)
##  9600 (0.0)
##  9700 (0.0)
##  9800 (0.0)
##  9900 (0.0)
##  10000 (0.0)
##  10100 (0.0)
##  10200 (0.0)
##  10300 (0.0)
##  10400 (0.0)
##  10500 (0.0)
##  10600 (0.0)
##  10700 (0.0)
##  10800 (0.0)
##  10900 (0.0)
##  11000 (0.0)
##  11100 (0.0)
##  11200 (0.0)
##  11300 (0.0)
##  11400 (0.0)
##  11500 (0.0)
##  11600 (0.0)
##  11700 (0.0)
##  11800 (0.0)
##  11900 (0.0)
##  12000 (0.0)
##  12100 (0.0)
##  12200 (0.0)
##  12300 (0.0)
##  12400 (0.0)
##  12500 (0.0)
##  12600 (0.0)
##  12700 (0.0)
##  12800 (0.0)
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##  12900 (0.0)
##  13000 (0.0)
##  13100 (0.0)
##  13200 (0.0)
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##  13400 (0.0)
##  13500 (0.0)
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##  13700 (0.0)
##  13800 (0.0)
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##  14100 (0.0)
##  14200 (0.0)
##  14300 (0.0)
##  14400 (0.0)
##  14500 (0.0)
##  14600 (0.0)
##  14700 (0.0)
##  14800 (0.0)
##  14900 (0.0)
##  15000 (0.0)
##  15100 (0.0)
##  15200 (0.0)
##  15300 (0.0)
##  15400 (0.0)
##  15500 (0.0)
##  15600 (0.0)
##  15700 (0.0)
##  15800 (0.0)
##  15900 (0.0)
##  16000 (0.0)
##  16100 (0.0)
##  16200 (0.0)
##  16300 (0.0)
##  16400 (0.0)
##  16500 (0.0)
##  16600 (0.0)
##  16700 (0.0)
##  16800 (0.0)
##  16900 (0.0)
##  17000 (0.0)
##  17100 (0.0)
##  17200 (0.0)
##  17300 (0.0)
##  17400 (0.0)
##  17500 (0.0)
##  17600 (0.0)
##  17700 (0.0)
##  17800 (0.0)
##  17900 (0.0)
##  18000 (0.0)
##  18100 (0.0)
##  18200 (0.0)
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##  18300 (0.0)
##  18400 (0.0)
##  18500 (0.0)
##  18600 (0.0)
##  18700 (0.0)
##  18800 (0.0)
##  18900 (0.0)
##  19000 (0.0)
##  19100 (0.0)
##  19200 (0.0)
##  19300 (0.0)
##  19400 (0.0)
##  19500 (0.0)
##  19600 (0.0)
##  19700 (0.0)
##  19800 (0.0)
##  19900 (0.0)
##  20000 (0.0)
##  20100 (0.0)
##  20200 (0.0)
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##  20400 (0.0)
##  20500 (0.0)
##  20600 (0.0)
##  20700 (0.0)
##  20800 (0.0)
##  20900 (0.0)
##  21000 (0.0)
##  21100 (0.0)
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##  21700 (0.0)
##  21800 (0.0)
##  21900 (0.0)
##  22000 (0.0)
##  22100 (0.0)
##  22200 (0.0)
##  22300 (0.0)
##  22400 (0.0)
##  22500 (0.0)
##  22600 (0.0)
##  22700 (0.0)
##  22800 (0.0)
##  22900 (0.0)
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##  23100 (0.0)
##  23200 (0.0)
##  23300 (0.0)
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##  23700 (0.0)
##  23800 (0.0)
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##  24700 (0.0)
##  24800 (0.0)
##  24900 (0.0)
##  25000 (0.0)
##  25100 (0.0)
##  25200 (0.0)
##  25300 (0.0)
##  25400 (0.0)
##  25500 (0.0)
##  25600 (0.0)
##  25700 (0.0)
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##  26200 (0.0)
##  26300 (0.0)
##  26400 (0.0)
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##  27000 (0.0)
##  27100 (0.0)
##  27200 (0.0)
##  27300 (0.0)
##  27400 (0.0)
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##  29100 (0.0)
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##  30100 (0.0)
##  30200 (0.0)
##  30300 (0.0)
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##  30700 (0.0)
##  30800 (0.0)
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##  31900 (0.0)
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##  32500 (0.0)
##  32600 (0.0)
##  32700 (0.0)
##  32800 (0.0)
##  32900 (0.0)
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##  33100 (0.0)
##  33200 (0.0)
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##  33700 (0.0)
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##  33900 (0.0)
##  34000 (0.0)
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##  34200 (0.0)
##  34300 (0.0)
##  34400 (0.0)
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##  34500 (0.0)
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##  34700 (0.0)
##  34800 (0.0)
##  34900 (0.0)
##  35000 (0.0)
##  35100 (0.0)
##  35200 (0.0)
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##  35400 (0.0)
##  35500 (0.0)
##  35600 (0.0)
##  35700 (0.0)
##  35800 (0.0)
##  35900 (0.0)
##  36000 (0.0)
##  36100 (0.0)
##  36200 (0.0)
##  36300 (0.0)
##  36400 (0.0)
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##  39700 (0.0)
##  39800 (0.0)
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##  39900 (0.0)
##  40000 (0.0)
##  40100 (0.0)
##  40200 (0.0)
##  40300 (0.0)
##  40400 (0.0)
##  40500 (0.0)
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##  40700 (0.0)
##  40800 (0.0)
##  40900 (0.0)
##  41000 (0.0)
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##  41300 (0.0)
##  41400 (0.0)
##  41500 (0.0)
##  41600 (0.0)
##  41700 (0.0)
##  41800 (0.0)
##  41900 (0.0)
##  42000 (0.0)
##  42100 (0.0)
##  42200 (0.0)
##  42300 (0.0)
##  42400 (0.0)
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##  42800 (0.0)
##  42900 (0.0)
##  43000 (0.0)
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##  45300 (0.0)
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##  46300 (0.0)
##  46400 (0.0)
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##  46600 (0.0)
##  46700 (0.0)
##  46800 (0.0)
##  46900 (0.0)
##  47000 (0.0)
##  47100 (0.0)
##  47200 (0.0)
##  47300 (0.0)
##  47400 (0.0)
##  47500 (0.0)
##  47600 (0.0)
##  47700 (0.0)
##  47800 (0.0)
##  47900 (0.0)
##  48000 (0.0)
##  48100 (0.0)
##  48200 (0.0)
##  48300 (0.0)
##  48400 (0.0)
##  48500 (0.0)
##  48600 (0.0)
##  48700 (0.0)
##  48800 (0.0)
##  48900 (0.0)
##  49000 (0.0)
##  49100 (0.0)
##  49200 (0.0)
##  49300 (0.0)
##  49400 (0.0)
##  49500 (0.0)
##  49600 (0.0)
##  49700 (0.0)
##  49800 (0.0)
##  49900 (0.0)
##  50000 (0.0)
##  Total Time Elapsed: 0.03
## Summary of Posterior Marginal Distributions
## Moments
##   tvalues  mean std dev num se rel eff sam size
## 1       0 -0.52    0.33 0.0026     2.7    15000
```
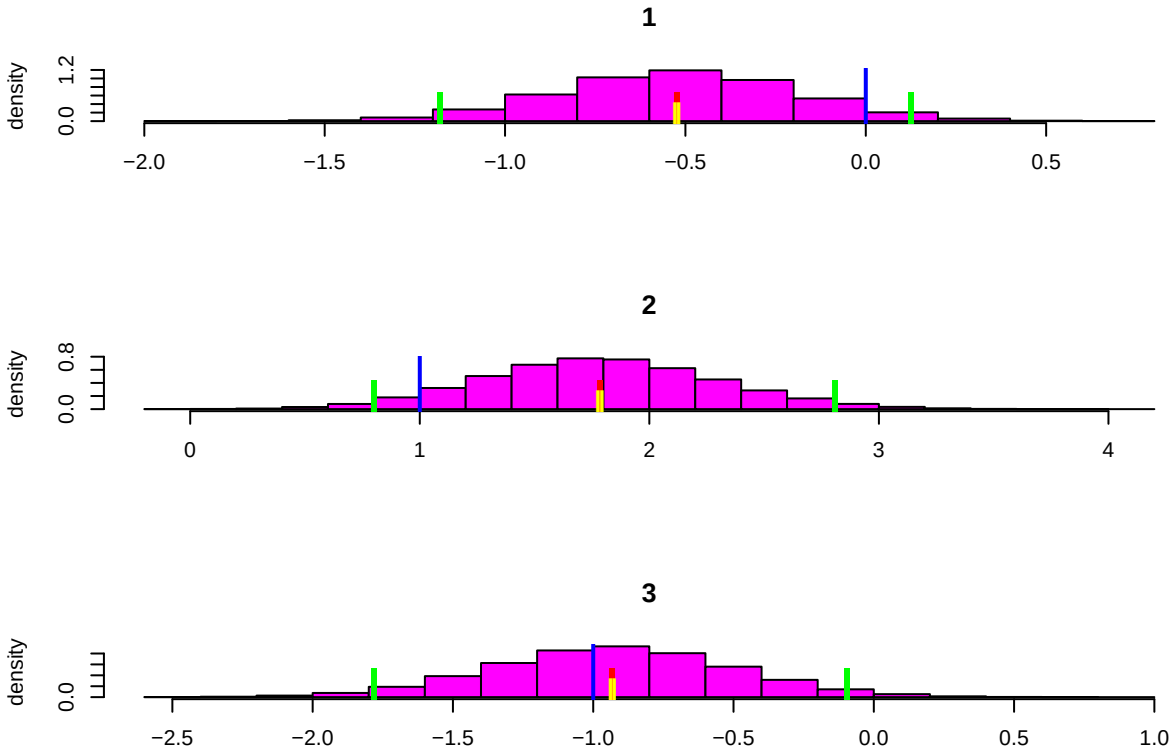
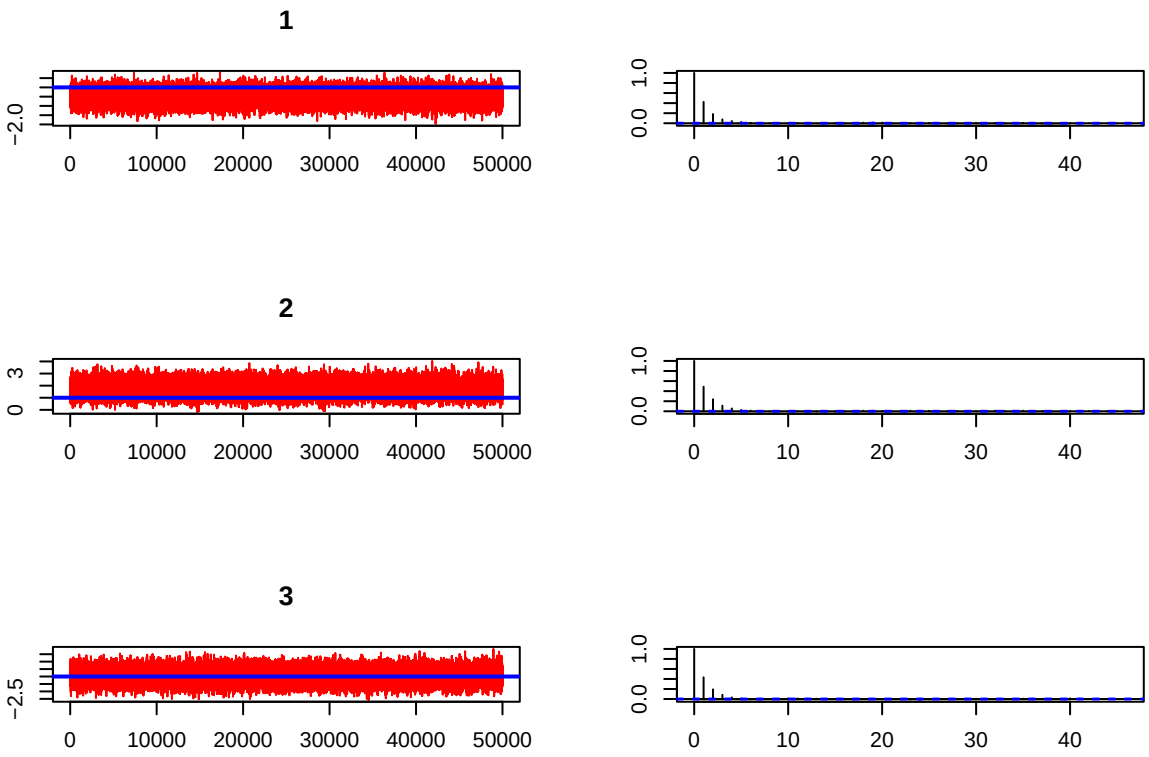

```
## 2       1  1.79    0.51 0.0043     3.2    11250
## 3      -1 -0.93    0.43 0.0033     2.6    15000
##
## Quantiles
##   tvalues 2.5%    5%   50%    95%  97.5%
## 1       0 -1.2 -1.07 -0.52  0.018  0.126
## 2       1  0.8  0.96  1.78  2.644  2.811
## 3      -1 -1.8 -1.64 -0.93 -0.228 -0.097
##    based on 45000 valid draws (burn-in=5000)
```





Given the model structure, I expect that we cannot tell apart the effects of θ_2 and θ_3 on their joint distribution; hence, we cannot estimate the parameters θ_2, θ_3 consistently.The chunk above produces a long pdf because iterations get printed; I don't know how to fix that.

Question 2

The model is a Multinomial, where we use the following distributional objects to obtain y_i:

$$p(X_i|\beta, \sigma_{12}, z_i), p(\beta|X_i, \sigma_{12}, z_i), p(\sigma_{12}|X_i, \beta, z_i), p(z_j|X_i, \beta, \sigma_{12}, y_i, z_{-j}), p(y_i|z_i) \tag{1}$$