MCAR simulation-Method 1

7/20/2017

```
##run n_iter=10000 iterations
time
```

```
##      user    system   elapsed
## 1343.017  147.527 1494.171
```

```
burnin=5000
(posterior.mean.eta=apply(eta_keep[-(1:burnin),],2, mean))
```

```
## [1]  0.0000000  1.6349575  1.1415144 -0.4110803
```

```
(posterior.mean.M=apply(M_keep[-(1:burnin),],2, mean))
```

```
## [1]  0.0000000  0.5444637  1.0338653 -0.5418720
```

```
(posterior.mean.v=apply(v_keep[-(1:burnin),],2, mean))
```

```
## [1]  0.5088443 -0.3050150
```

```
(posterior.mean.beta=apply(beta_keep[-(1:burnin),],2, mean))
```

```
## [1] -0.1565121  0.9105573
```

```
(posterior.mean.sgmr2=mean(sgmr2_keep[-(1:burnin)]))
```

```
## [1] 16.17968
```

```
(posterior.mean.sgm2=mean(sgm2_keep[-(1:burnin)]))
```

```
## [1] 7.065652
```

```
(posterior.mean.E=mean(E_keep[-(1:burnin)]))
```

```
## [1] 1.682347
```

```
##mean of imputed X
MI.mean.X=apply(X_keep[-(1:burnin),], 2, mean)
##difference with the true X
(diff=MI.mean.X-(XR$X)[R_sim==0])
```

```
##    [1]   3.01227106  -1.44435996  -1.04863812  -0.09840164  -0.62637019
##    [6]   0.57618714   0.58004445   2.09180588  -0.78273611   4.05815182
##   [11]   4.08602336   3.42826710   0.81518240  -0.10400344   1.62313741
##   [16]  -1.32710294  -0.90455230  -1.01699538  -3.58083466   0.66182400
##   [21]  -0.55570577   0.18320631  -0.54824816  -1.53547137   0.98810750
##   [26]   0.12915423  -0.89813689  -0.60709200  -2.20476675   9.40297543
##   [31]  11.63018342   7.33957819   6.92978551   1.42383127  -2.30613928
##   [36]  -6.93292243 -10.19109565   3.62959592   3.09600649   1.33926261
##   [41]  -2.47419733  -5.97965557  -0.54475696   1.70536463   0.98120389
##   [46]  -1.53894922  -0.20024873  -1.00538271  -3.98324977   2.63517975
##   [51]   0.44966883   1.52374320  -2.82150106  -3.61214402  -7.35593046
##   [56]  -7.51563122  -3.82344033   4.11793959   8.46364781   6.74469822
##   [61]  -1.79551366  -1.56479108   1.31099042   0.36995724  -0.68294936
##   [66]   0.57289798  -1.81388445  -1.20037529  -1.08814139   0.84296818
##   [71]   0.78114607   0.60372531   0.28003480  -0.56510934  -0.08938579
```

```
## [76]    1.46143775  -0.63639590   0.36746933   0.43588493   1.59588121
## [81]    0.68750907  -0.62011148   0.79610896   1.57162381  -2.25233186
## [86]    0.43101386  -1.59407307   0.31312570   0.79672375  -0.21037168
## [91]   -1.51333699   0.68481049   1.46831060   0.40670954  -1.44950205
## [96]   -1.27000932  -1.46826837   1.25548637  -1.15470817   0.38066382
## [101]   0.55863411  -0.71489240  -0.82065416   1.60900414  -0.07739519
## [106]   0.29699327  -0.21776173  -1.82225730  -0.98078152  -0.51031802
## [111]  -0.71726964  -1.15536855  -0.88240312  -0.66690333  -0.26599300
## [116]   0.12571099  -0.29244712  -0.16936438   0.83138833  -0.84541234
## [121]  -0.10990902  -0.05034994  -0.74419436   1.37730539  -0.44184786
## [126]  -0.39337781   0.31076502  -1.05186961  -7.20014262  -4.03403621
## [131]  -4.09386551  -2.46480146  -1.47101719   1.99842328   2.47882570
## [136]   4.37067198   2.43807165   0.09093532  -0.57702414  -0.60042504
## [141]  -2.51716294  -2.55141057  -2.53895626  -0.64434457  -0.10822769
## [146]   0.25729619  -0.42522683  -1.89322426  -0.31064242  -1.31400503
## [151]  -1.11564440  -0.10867355   0.35660315   3.53457111   1.82742672
## [156]  -0.86842548   1.23387246  -0.05817787  -1.47150557  -1.17734240
## [161]  -0.18824434  -0.06747082   0.42972921  -0.90943313  -0.07401468
## [166]  -1.06305291  -0.73138043   1.74251288   1.76073629   7.04023755
## [171]   1.47799958   0.77811391  -0.41916422  -0.35567095   0.05851150
## [176]  -1.44361554  -2.94542587  -0.33795402  -1.16987627  -3.99745382
## [181]   2.51201769   1.70324931   1.51487615   1.43614924   1.06555616
## [186]  -0.07066550  -0.24744552   0.56454899   2.09257293   2.96585334
## [191]  -0.54753322  -0.36535985   0.60072720   1.25322416   1.10514727
## [196]   1.93542283   1.18539614  -0.40279579  -2.11140507   0.71431141
## [201]   0.35920469   1.25098569  -0.60863294   4.94124005   5.99987931
## [206]   3.27095575   2.93641776  -4.27025798   1.47013189   1.68534139
## [211]  -0.78543311   0.73253714  -2.25432648   4.45220451   2.57331546
## [216]  -0.69029277  -7.54266432   0.84400634  -0.90775994  -0.40095195
## [221]   0.61051149  -0.49556860  -1.88884341  -1.40301037  -0.86995372
## [226]  -1.34728841  -0.73857172  -0.87698593   1.05117140   0.80751315
## [231]   1.47765073   1.35523794   1.70783117   5.09456138   2.54703183
## [236]  -2.40023479  -1.62086714   0.59284757   0.37094234   1.08490738
## [241]  -1.05244896   1.01371559   1.14591422   2.20284010   1.10413935
## [246]  -0.37800970  -0.37441330   0.03575681   0.67710636  -0.26438950
## [251]   0.35350441   0.90103167   0.34357347   0.09288226   0.37428180
## [256]   0.21492914  11.67588522  10.65391508   8.55511663   7.21078321
## [261]   4.86305509   5.89197363  -0.18414378  -2.75630185  -3.88367552
## [266]  -6.87422966  -5.94385250  -7.14044688  -4.31987451  -3.26472691
## [271]  -1.21164306   5.91226671   6.96333069   0.48667682   0.88150675
## [276]  -1.07498374   0.08698806   0.87227499  -0.07907376  -7.45343187
## [281]  -2.50218787  -3.31213830  -0.81298965   0.05721942   3.86782651
## [286]   2.49299084   3.67831192   2.95027272  -3.62459448   0.33985717
## [291]   1.36977394  -1.65448509  -3.21842402  -2.17227321   0.28541803
## [296]  -0.68113322  -0.11286396  -0.33061309  -1.32864540  -0.76814294
## [301]  -0.63286716  -0.38452119  -0.19963613   0.76928918   1.49831053
## [306]  -1.14916716   0.30155544   0.38008489  -1.08912727  -0.73321122
## [311]   0.03770813  -0.46877740  -0.95145714  -1.33456356   2.07431749
## [316]  -0.53992894   0.40729425   1.26695528   0.16263418  -1.14820002
## [321]  -1.13546694  -0.36848255  -1.73496112  10.67163824  11.80712531
## [326]   7.44964035   4.53626252   5.08275498  -0.33744670  -2.90390179
## [331]  -7.50202026  -8.56156566 -10.74942496  -2.03179097  -0.91903185
## [336]  -0.04553581   1.81896140   1.06329785   0.63855471   1.43638069
## [341]   2.08814845   0.97115120  -0.00064092  -0.19336552  -1.96618109
```

```
## [346]    0.54500895    1.21889024   -0.85242479   -1.47661445    0.47661471
## [351]    0.93117214   -0.98048867    0.86880834    1.28163933   -1.84384886
## [356]   -1.74167791   -1.23849412   -6.07896836   -2.91635829   -1.28699696
## [361]    5.52597619    1.06916255   -0.55630805   -0.19219790   -0.37074715
## [366]    0.73626363    1.15573725    0.45999314    2.54048822    0.35848437
## [371]   -0.88616715   -1.60577936    2.02692451    1.28713536    0.66156547
## [376]    0.19041252    3.05188199   -2.82082794   -1.34487698   -0.13038930
## [381]   -2.40594091    1.88979036    0.38871716   -0.04212746   -1.02515460
## [386]    0.25518253   -0.38883106    0.88456276    0.33990727    0.89241635
## [391]    1.58005167   -1.21679373    0.28909328    0.27156534    0.87675409
## [396]    0.05581708    0.31448071    0.17012014    0.34494408    1.75482243
## [401]   -1.91586130    3.25831874    6.83921867    7.57794052    0.69042205
## [406]    2.27599121    0.59537189   -1.31677760   -0.48269490    0.82432527
## [411]   -0.64550236    0.97493196   -0.11037195   -1.34442554   -1.16921612
## [416]   -0.07728503    0.49124475   -0.97483816    1.40570532   -0.93142889
## [421]    0.21918217   -0.42055889   -0.17107128   -0.48970315   -0.02036953
## [426]    0.42071884   -0.64428824    0.65359867    1.31361802    2.31171667
## [431]   -3.24238463    0.47249083   -0.36695084   -1.71827158   -1.76956780
## [436]    0.38233606    1.67705401   -0.10985679    0.31809026    0.61501391
## [441]   -0.89694163    1.01467615   -0.09501880   -0.19597877    0.39232662
## [446]    0.91505033    1.70962785    1.02046071   -0.91020875    1.65028089
## [451]   -2.60378957   -2.16825292    0.88237792    0.24337538    0.52862730
## [456]    0.32116008    0.16923354   -6.71299891   -8.12987305   -6.38754914
## [461]   -4.68673662   -2.46124543    4.02672209    7.51019608
```
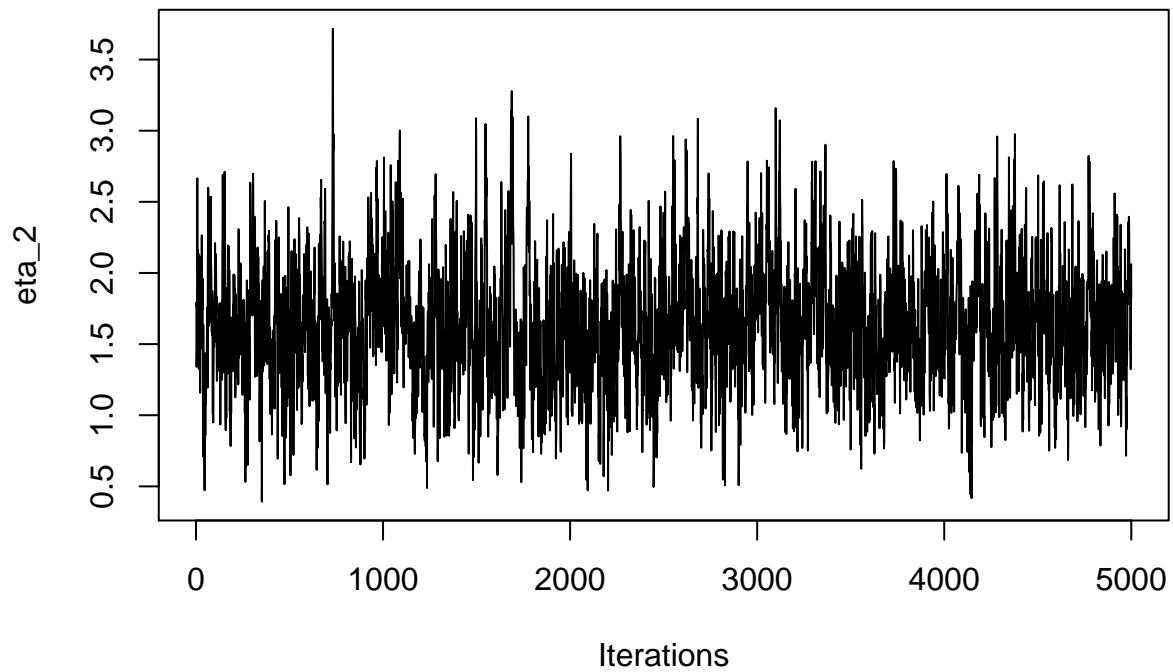
```r
min(diff)
```

```
## [1] -10.74942
```

```r
max(diff)
```
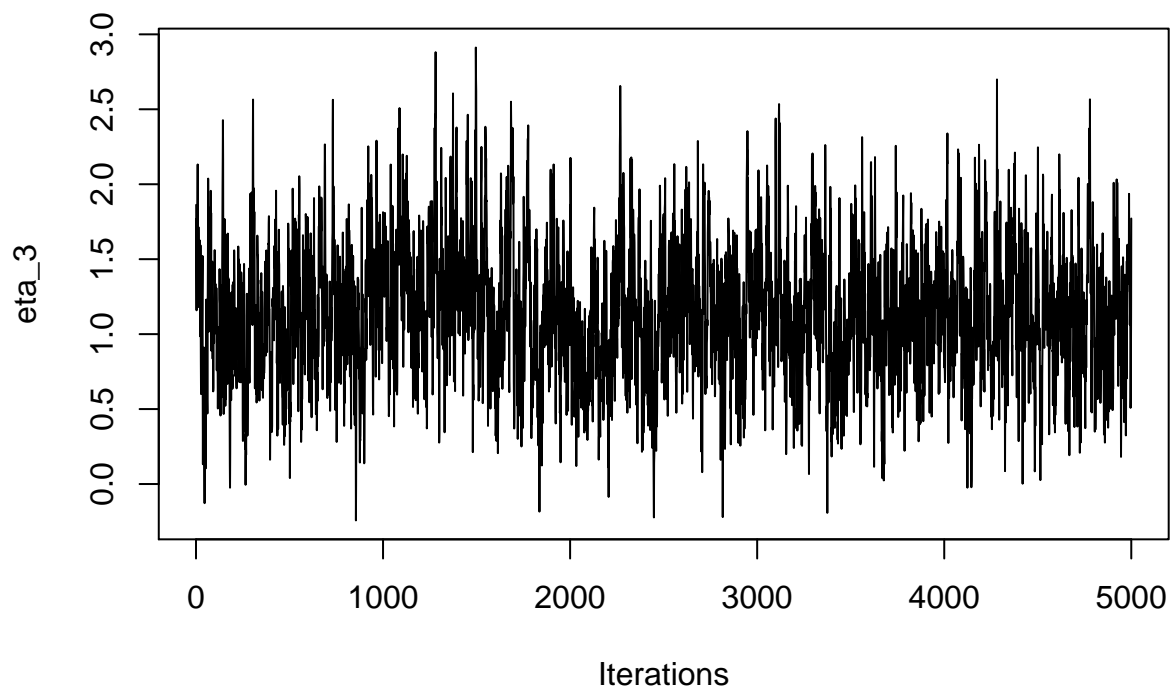
```
## [1] 11.80713
```
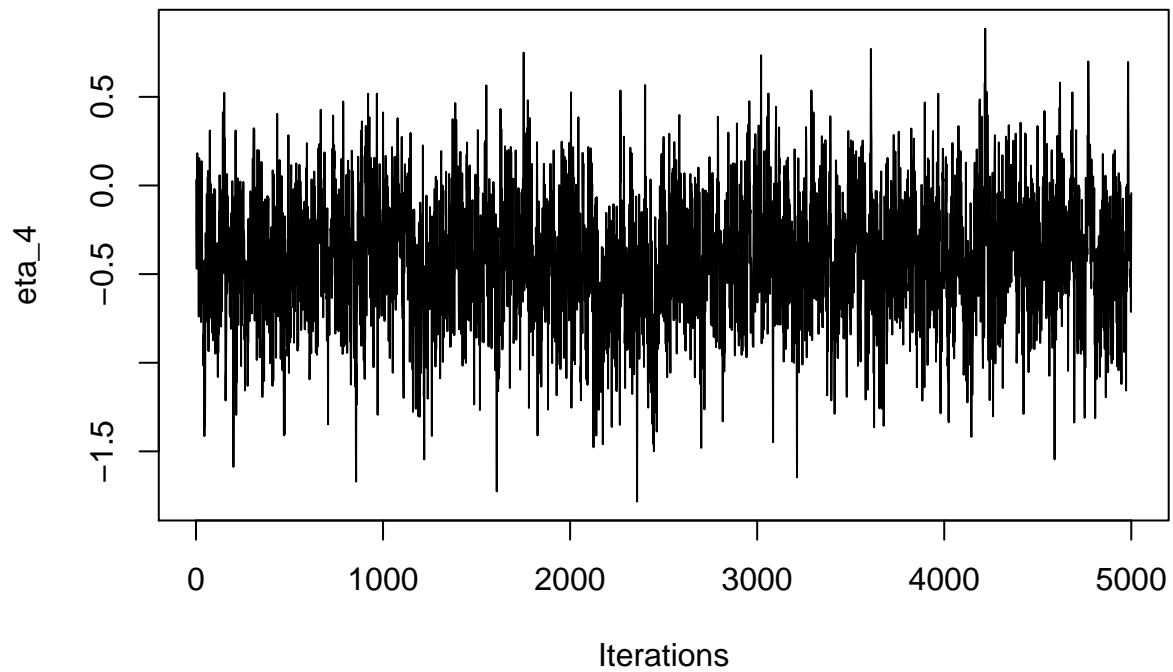
```r
##traceplots after burn-in
##ture value of eta2 is 0.5
traceplot(x=as.mcmc(eta_keep[-(1:burnin),2]), ylab="eta_2")
```
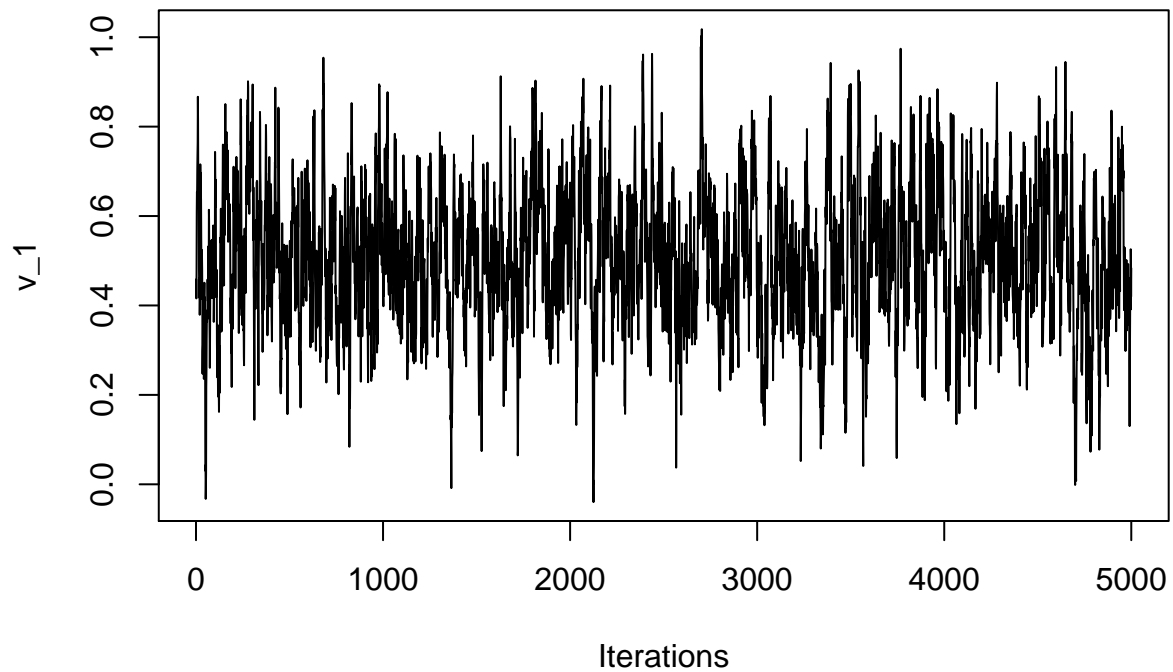
```
##true value of eta3 is 1.5
traceplot(x=as.mcmc(eta_keep[-(1:burnin),3]), ylab="eta_3")
```
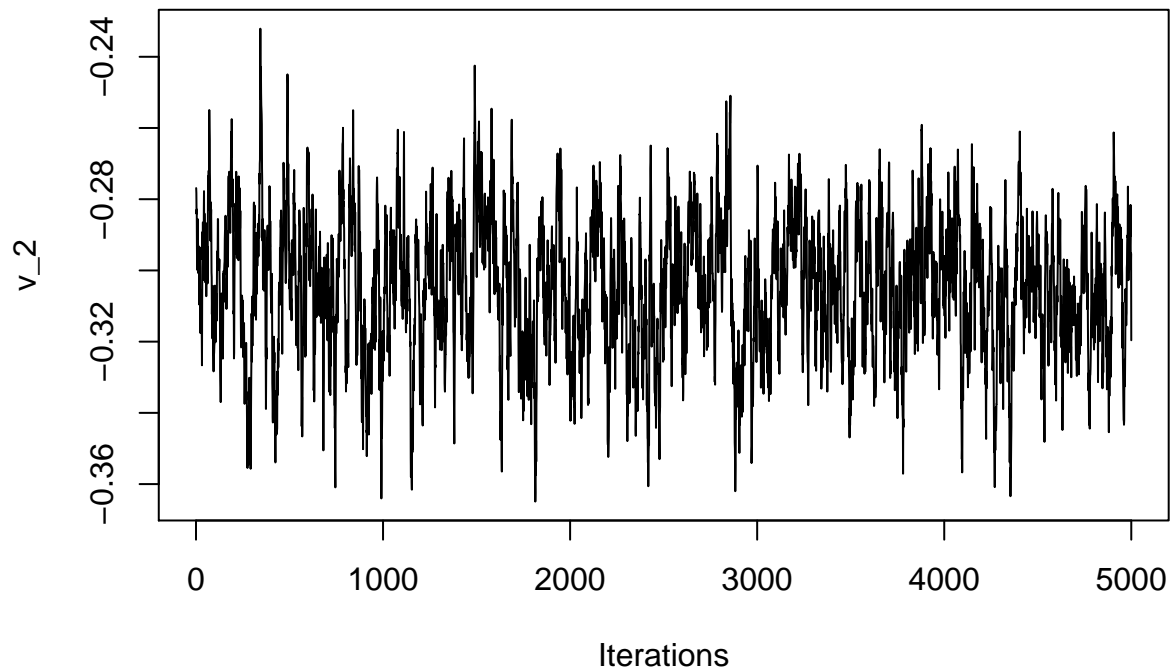


```
##true value of eta4 is 1
traceplot(x=as.mcmc(eta_keep[-(1:burnin),4]), ylab="eta_4")
```
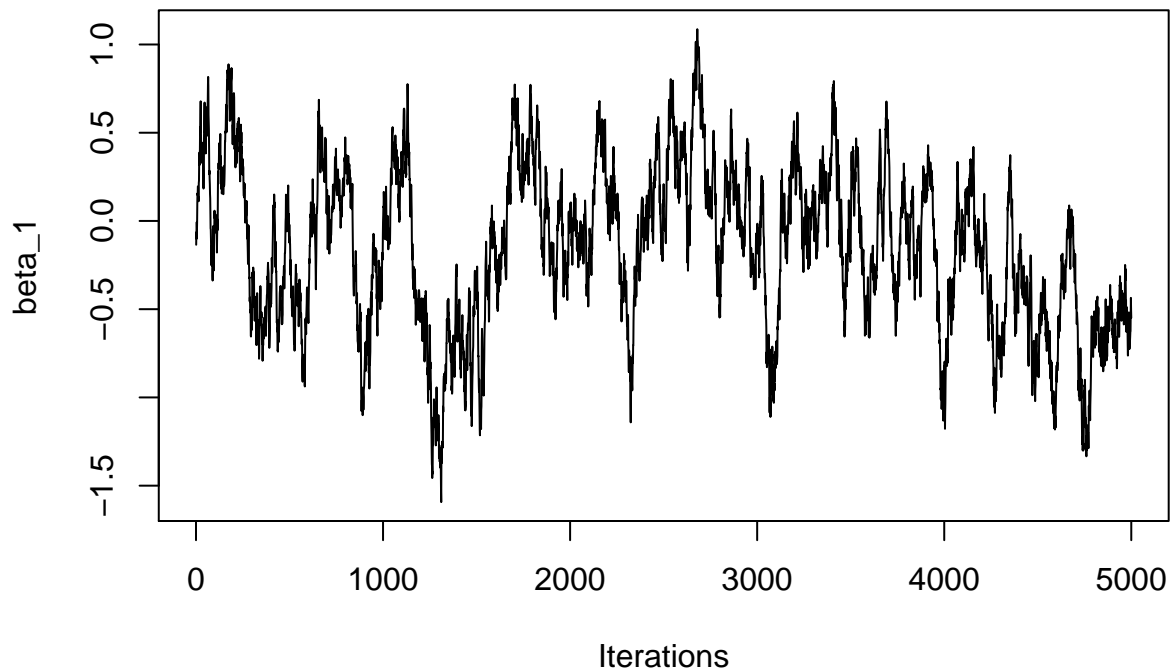
```
##true value of v1 is 0.5
traceplot(x=as.mcmc(v_keep[-(1:burnin),1]), ylab="v_1")
```
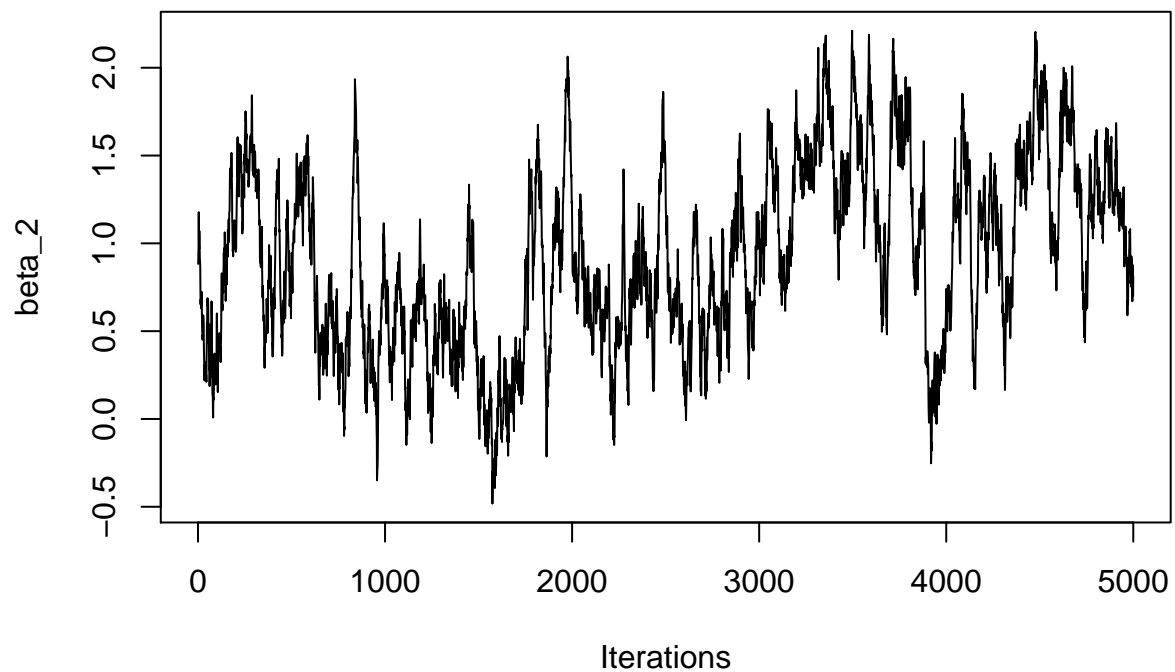


```
##true value of v2 is -0.3
traceplot(x=as.mcmc(v_keep[-(1:burnin),2]), ylab="v_2")
```
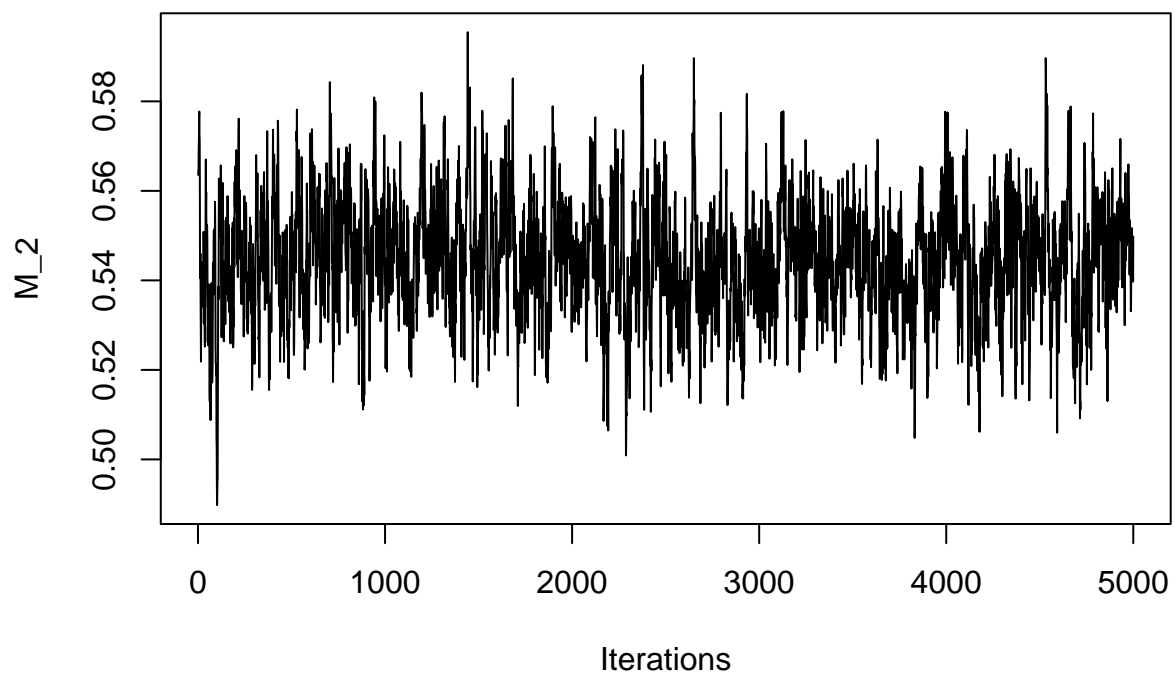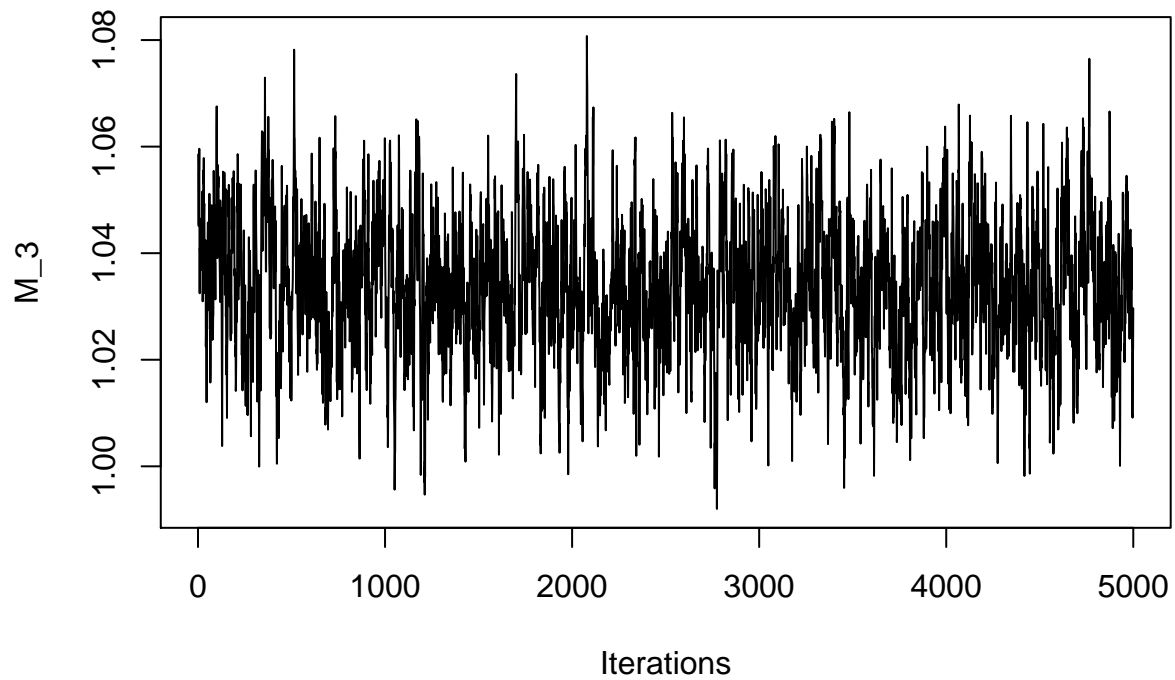
```
##true value of beta1 is -0.4
traceplot(x=as.mcmc(beta_keep[-(1:burnin),1]), ylab="beta_1")
```



```
##true value of beta2 is 0.5
traceplot(x=as.mcmc(beta_keep[-(1:burnin),2]), ylab="beta_2")
```
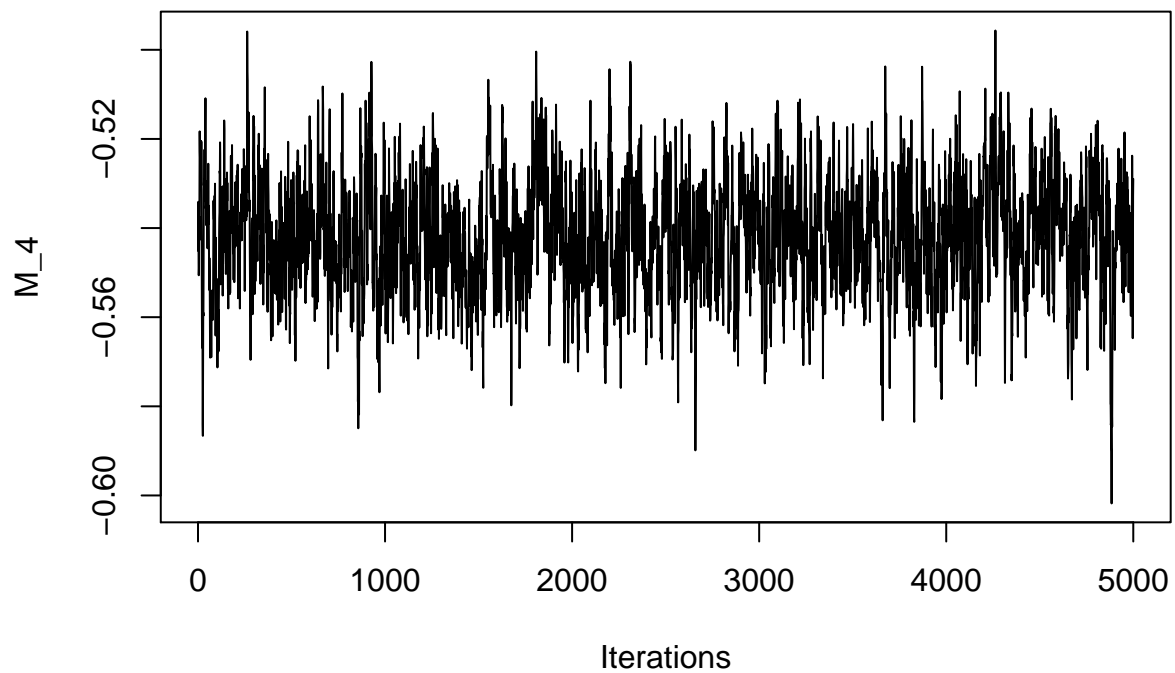
```
##true value of M2 is -0.6
traceplot(x=as.mcmc(M_keep[-(1:burnin),2]), ylab="M_2")
```
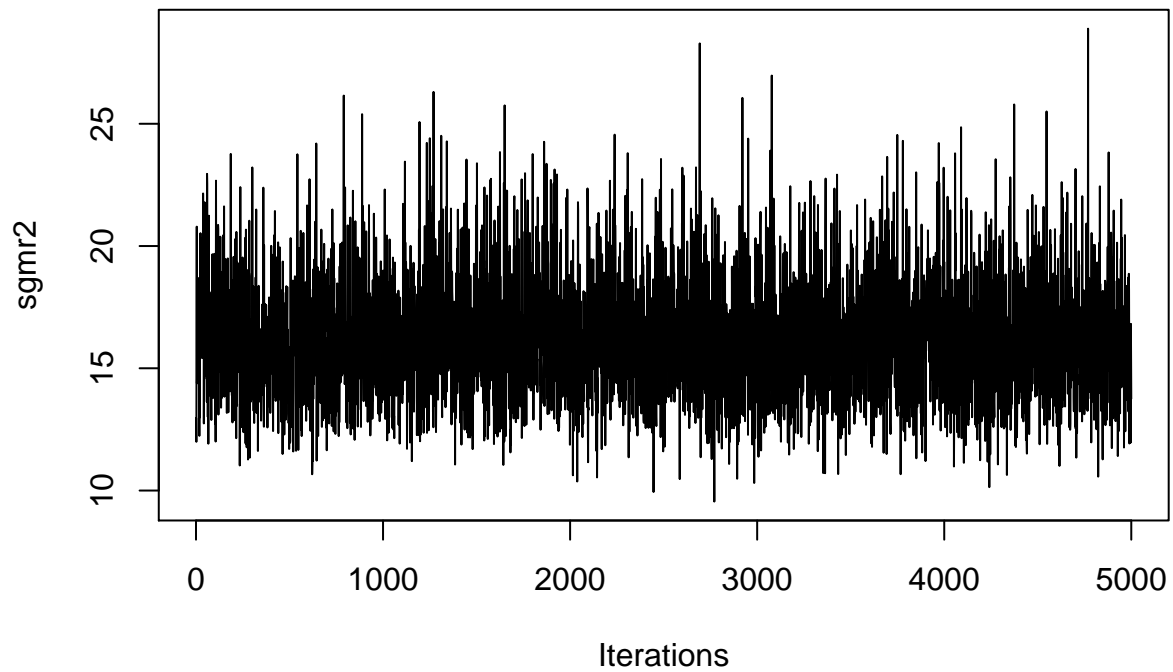


```
##true value of M3 is 0.6
traceplot(x=as.mcmc(M_keep[-(1:burnin),3]), ylab="M_3")
```
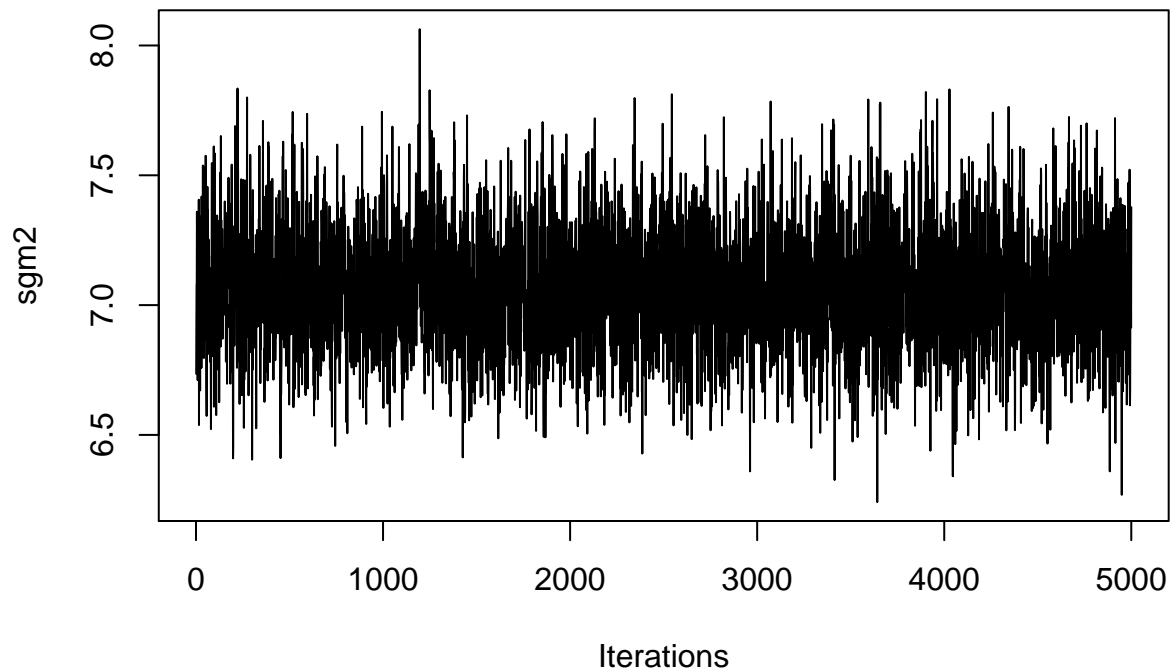
```
##true value of M4 is 1.2
traceplot(x=as.mcmc(M_keep[-(1:burnin),4]), ylab="M_4")
```



```
##true value of sgmr2 is 1
traceplot(x=as.mcmc(sgmr2_keep[-(1:burnin)]), ylab="sgmr2")
```

```
##true value of sgm2 is 1
traceplot(x=as.mcmc(sgm2_keep[-(1:burnin)]), ylab="sgm2")
```



```
##true value of E is 1
traceplot(x=as.mcmc(E_keep[-(1:burnin)]), ylab="E")
```