

## Version 3: 3 clusters

### Simulate data

```
I <- 50
K <- 3
S <- 10

# choose diffuse priors for gamma
a_gamma <- 2
b_gamma <- 10

set.seed(123)

a <- matrix(NA, nrow=K, ncol=S)
b <- matrix(NA, nrow=K, ncol=S)
for (s in 1:S) {
  a[, s] <- rgamma(K, a_gamma, rate = 1/b_gamma)
  b[, s] <- rgamma(K, a_gamma, rate = 1/b_gamma)
}

# reorder a,b matrices to match ordering of means (U) in S1
U <- a/(a+b)
V <- a+b
U.ordered <- U[order(U[,1]), ]
a.ordered <- a[order(U[,1]), ]
b.ordered <- b[order(U[,1]), ]
V.ordered <- V[order(U[,1]), ]

pi <- as.vector(rdirichlet(1, rep(1, K)))
z <- sample(1:K, size = I, replace = T, prob = pi)

w <- matrix(NA, nrow=I, ncol=S)
for (s in 1:S) {
  w[, s] <- rbeta(I, a.ordered[,s][z], b.ordered[,s][z])
}

tcn <- matrix(2, nrow=I, ncol=S)
m <- matrix(rep(sample(1:2, size = I, replace = T), S), nrow=I, ncol=S)

calcTheta <- function(m, tcn, w) {
  (m * w) / (tcn * w + 2*(1-w))
}
theta <- calcTheta(m, tcn, w)

n <- replicate(S, rpois(I, 100))
y <- matrix(NA, nrow=I, ncol=S)
for (i in 1:I) {
  for (s in 1:S) {
    y[i, s] <- rbinom(1, n[i, s], theta[i,s])
  }
}
```

```
}
```

## JAGS

```
jags.file <- file.path(models.dir, "v3_noConstraints_mode.jags")

test.data <- list("I" = I, "S" = S, "K" = K,
                  "y" = y, "n" = n,
                  "m" = m, "tcn" = tcn)
jags.m <- jags.model(jags.file, test.data,
                     n.chains = 1,
                     inits = list(".RNG.name" = "base::Wichmann-Hill",
                                   ".RNG.seed" = 123))
```

```
## Compiling model graph
##   Resolving undeclared variables
##   Allocating nodes
## Graph information:
##   Observed stochastic nodes: 500
##   Unobserved stochastic nodes: 611
##   Total graph size: 8601
##
## Initializing model
```

```
params <- c("z", "w", "d", "c")
samps <- coda.samples(jags.m, params, n.iter=10000, thin=7)
s <- summary(samps)
effectiveSize(samps)
```

```
##      c[1,1]      c[2,1]      c[3,1]      c[1,2]      c[2,2]      c[3,2]
## 1221.46115 1276.95275 1092.45681 1231.05964 1428.00000 1318.64536
##      c[1,3]      c[2,3]      c[3,3]      c[1,4]      c[2,4]      c[3,4]
## 1139.29205 1168.97273 1322.54634 1122.09375 1067.65587 1094.93851
##      c[1,5]      c[2,5]      c[3,5]      c[1,6]      c[2,6]      c[3,6]
## 1156.90707 1428.00000 1122.21815 1025.51972 1159.70540 1372.51095
##      c[1,7]      c[2,7]      c[3,7]      c[1,8]      c[2,8]      c[3,8]
## 1274.73749 1049.31297 1258.65287 819.83256 1411.00046 1428.00000
##      c[1,9]      c[2,9]      c[3,9]      c[1,10]     c[2,10]     c[3,10]
## 1126.29000 1283.47873 1428.00000 1222.59200 800.12556 1428.00000
##      d[1,1]      d[2,1]      d[3,1]      d[1,2]      d[2,2]      d[3,2]
## 1428.00000 1428.00000 470.23599 1015.92588 1376.14103 1594.13674
##      d[1,3]      d[2,3]      d[3,3]      d[1,4]      d[2,4]      d[3,4]
## 1057.04490 1428.00000 932.21541 1280.09451 1428.00000 364.73344
##      d[1,5]      d[2,5]      d[3,5]      d[1,6]      d[2,6]      d[3,6]
## 1230.19746 1428.00000 1133.74186 940.59134 1428.00000 1428.00000
##      d[1,7]      d[2,7]      d[3,7]      d[1,8]      d[2,8]      d[3,8]
## 1428.00000 1456.67901 1581.35617 827.93791 1428.00000 1715.75660
##      d[1,9]      d[2,9]      d[3,9]      d[1,10]     d[2,10]     d[3,10]
## 1160.08487 1428.00000 1311.76059 1428.00000 79.06556 1428.00000
##      w[1,1]      w[2,1]      w[3,1]      w[4,1]      w[5,1]      w[6,1]
## 1428.00000 1428.00000 1428.00000 1118.81994 1317.34025 1428.00000
##      w[7,1]      w[8,1]      w[9,1]      w[10,1]     w[11,1]     w[12,1]
## 1428.00000 1428.00000 1428.00000 1545.79684 1428.00000 1428.00000
```

##	w[13,1]	w[14,1]	w[15,1]	w[16,1]	w[17,1]	w[18,1]
##	1428.00000	2015.88407	1727.04186	1428.00000	1428.00000	1260.13380
##	w[19,1]	w[20,1]	w[21,1]	w[22,1]	w[23,1]	w[24,1]
##	1428.00000	1428.00000	1560.25138	1708.54427	1428.00000	1428.00000
##	w[25,1]	w[26,1]	w[27,1]	w[28,1]	w[29,1]	w[30,1]
##	1428.00000	1428.00000	1428.00000	966.62290	1357.02004	1428.00000
##	w[31,1]	w[32,1]	w[33,1]	w[34,1]	w[35,1]	w[36,1]
##	1571.75705	1428.00000	1428.00000	1428.00000	1402.44657	1428.00000
##	w[37,1]	w[38,1]	w[39,1]	w[40,1]	w[41,1]	w[42,1]
##	1428.00000	1428.00000	1428.00000	1244.45441	1294.91236	1428.00000
##	w[43,1]	w[44,1]	w[45,1]	w[46,1]	w[47,1]	w[48,1]
##	1428.00000	1428.00000	1428.00000	1428.00000	1428.00000	1247.12568
##	w[49,1]	w[50,1]	w[1,2]	w[2,2]	w[3,2]	w[4,2]
##	1546.93807	1428.00000	1217.99120	1428.00000	1428.00000	1428.00000
##	w[5,2]	w[6,2]	w[7,2]	w[8,2]	w[9,2]	w[10,2]
##	1228.62658	1428.00000	1341.68440	1262.32391	1428.00000	1428.00000
##	w[11,2]	w[12,2]	w[13,2]	w[14,2]	w[15,2]	w[16,2]
##	1020.58532	1276.00641	1296.88432	1661.38134	1428.00000	1428.65790
##	w[17,2]	w[18,2]	w[19,2]	w[20,2]	w[21,2]	w[22,2]
##	1428.00000	1658.46035	1428.00000	1428.00000	1542.83461	1428.00000
##	w[23,2]	w[24,2]	w[25,2]	w[26,2]	w[27,2]	w[28,2]
##	1428.00000	1314.19096	1428.00000	1428.00000	1428.00000	1428.00000
##	w[29,2]	w[30,2]	w[31,2]	w[32,2]	w[33,2]	w[34,2]
##	1412.46786	1428.00000	1428.00000	1314.37918	1972.45335	1428.00000
##	w[35,2]	w[36,2]	w[37,2]	w[38,2]	w[39,2]	w[40,2]
##	1394.53080	1428.00000	1428.00000	1428.00000	1251.14894	1556.56197
##	w[41,2]	w[42,2]	w[43,2]	w[44,2]	w[45,2]	w[46,2]
##	1313.46660	1305.12002	1428.00000	1428.00000	1428.00000	1428.00000
##	w[47,2]	w[48,2]	w[49,2]	w[50,2]	w[1,3]	w[2,3]
##	1428.00000	1428.00000	1428.00000	1184.21689	1428.00000	1428.00000
##	w[3,3]	w[4,3]	w[5,3]	w[6,3]	w[7,3]	w[8,3]
##	1428.00000	1323.84605	1428.00000	1428.00000	1428.00000	1428.00000
##	w[9,3]	w[10,3]	w[11,3]	w[12,3]	w[13,3]	w[14,3]
##	1729.73366	1428.00000	1428.00000	1428.00000	1428.00000	1428.00000
##	w[15,3]	w[16,3]	w[17,3]	w[18,3]	w[19,3]	w[20,3]
##	1428.00000	1553.84243	1539.90162	1428.00000	1569.80011	1428.00000
##	w[21,3]	w[22,3]	w[23,3]	w[24,3]	w[25,3]	w[26,3]
##	1428.00000	1428.00000	1428.00000	1818.01508	1280.30619	1428.00000
##	w[27,3]	w[28,3]	w[29,3]	w[30,3]	w[31,3]	w[32,3]
##	2022.58089	1582.00966	1428.00000	1428.00000	1203.83978	1428.00000
##	w[33,3]	w[34,3]	w[35,3]	w[36,3]	w[37,3]	w[38,3]
##	1428.00000	1428.00000	1428.00000	1642.16186	1428.00000	1428.00000
##	w[39,3]	w[40,3]	w[41,3]	w[42,3]	w[43,3]	w[44,3]
##	1428.00000	1428.00000	1428.00000	1428.00000	1428.00000	1693.45693
##	w[45,3]	w[46,3]	w[47,3]	w[48,3]	w[49,3]	w[50,3]
##	1428.00000	1428.00000	1428.00000	1567.50486	1428.00000	1306.47612
##	w[1,4]	w[2,4]	w[3,4]	w[4,4]	w[5,4]	w[6,4]
##	1428.00000	1523.30501	1780.89288	1428.00000	1428.00000	1583.83167
##	w[7,4]	w[8,4]	w[9,4]	w[10,4]	w[11,4]	w[12,4]
##	1428.00000	1428.00000	1270.67246	1651.15579	1428.00000	1428.00000
##	w[13,4]	w[14,4]	w[15,4]	w[16,4]	w[17,4]	w[18,4]
##	1428.00000	1428.00000	1320.82570	1428.00000	1310.18347	1428.00000
##	w[19,4]	w[20,4]	w[21,4]	w[22,4]	w[23,4]	w[24,4]
##	1428.00000	1428.00000	1464.17065	1428.00000	1428.00000	1428.00000

##	w[25,4]	w[26,4]	w[27,4]	w[28,4]	w[29,4]	w[30,4]
##	1428.00000	1428.00000	1253.58910	1193.56231	1428.00000	1428.00000
##	w[31,4]	w[32,4]	w[33,4]	w[34,4]	w[35,4]	w[36,4]
##	1307.51179	1428.00000	1428.00000	1428.00000	1428.00000	1562.07050
##	w[37,4]	w[38,4]	w[39,4]	w[40,4]	w[41,4]	w[42,4]
##	1428.00000	1428.00000	1428.00000	1428.00000	1428.00000	1428.00000
##	w[43,4]	w[44,4]	w[45,4]	w[46,4]	w[47,4]	w[48,4]
##	1428.00000	1428.00000	1320.33852	1428.00000	1291.03615	1428.00000
##	w[49,4]	w[50,4]	w[1,5]	w[2,5]	w[3,5]	w[4,5]
##	1428.00000	1428.00000	1428.00000	1267.17839	1428.00000	1428.00000
##	w[5,5]	w[6,5]	w[7,5]	w[8,5]	w[9,5]	w[10,5]
##	1428.00000	1428.00000	1428.00000	1428.00000	1646.71920	1428.00000
##	w[11,5]	w[12,5]	w[13,5]	w[14,5]	w[15,5]	w[16,5]
##	1321.21495	1428.00000	1315.37260	1428.00000	1428.00000	1293.24182
##	w[17,5]	w[18,5]	w[19,5]	w[20,5]	w[21,5]	w[22,5]
##	1318.29226	1428.00000	1428.00000	1428.00000	1321.35657	1428.00000
##	w[23,5]	w[24,5]	w[25,5]	w[26,5]	w[27,5]	w[28,5]
##	1428.00000	1428.00000	1428.00000	1428.00000	1561.09476	1428.00000
##	w[29,5]	w[30,5]	w[31,5]	w[32,5]	w[33,5]	w[34,5]
##	1164.88632	1428.00000	1301.09689	1428.00000	1428.00000	1428.00000
##	w[35,5]	w[36,5]	w[37,5]	w[38,5]	w[39,5]	w[40,5]
##	1555.81471	1428.00000	1428.00000	1428.00000	1428.00000	1428.00000
##	w[41,5]	w[42,5]	w[43,5]	w[44,5]	w[45,5]	w[46,5]
##	1428.00000	1428.00000	1428.00000	1428.00000	1428.00000	1352.80067
##	w[47,5]	w[48,5]	w[49,5]	w[50,5]	w[1,6]	w[2,6]
##	1360.91636	1428.00000	1428.00000	1300.38434	2071.01222	1428.00000
##	w[3,6]	w[4,6]	w[5,6]	w[6,6]	w[7,6]	w[8,6]
##	1428.00000	1428.00000	1428.00000	1428.00000	1428.00000	1428.00000
##	w[9,6]	w[10,6]	w[11,6]	w[12,6]	w[13,6]	w[14,6]
##	1428.00000	1428.00000	1428.00000	1311.05312	1428.00000	1428.00000
##	w[15,6]	w[16,6]	w[17,6]	w[18,6]	w[19,6]	w[20,6]
##	1428.00000	1428.00000	1428.00000	1428.00000	1428.00000	1428.00000
##	w[21,6]	w[22,6]	w[23,6]	w[24,6]	w[25,6]	w[26,6]
##	1428.00000	1428.00000	1709.73028	1764.16285	1428.00000	1289.23493
##	w[27,6]	w[28,6]	w[29,6]	w[30,6]	w[31,6]	w[32,6]
##	1428.00000	1411.90704	1428.00000	1428.00000	1428.00000	1428.00000
##	w[33,6]	w[34,6]	w[35,6]	w[36,6]	w[37,6]	w[38,6]
##	1428.00000	1428.00000	1378.98818	1572.94388	1428.00000	1428.00000
##	w[39,6]	w[40,6]	w[41,6]	w[42,6]	w[43,6]	w[44,6]
##	1348.38093	1558.09445	1428.00000	1254.60454	2055.24957	1471.62657
##	w[45,6]	w[46,6]	w[47,6]	w[48,6]	w[49,6]	w[50,6]
##	1297.51608	1546.70725	1428.00000	863.78975	1775.21685	1428.00000
##	w[1,7]	w[2,7]	w[3,7]	w[4,7]	w[5,7]	w[6,7]
##	1428.00000	1703.40559	1428.00000	1428.00000	1280.08967	1428.00000
##	w[7,7]	w[8,7]	w[9,7]	w[10,7]	w[11,7]	w[12,7]
##	1428.00000	1428.00000	1428.00000	1396.72868	1308.12621	1428.00000
##	w[13,7]	w[14,7]	w[15,7]	w[16,7]	w[17,7]	w[18,7]
##	1704.69944	1257.49253	1428.00000	1428.00000	1428.00000	1428.00000
##	w[19,7]	w[20,7]	w[21,7]	w[22,7]	w[23,7]	w[24,7]
##	1428.00000	1428.00000	1428.00000	1428.00000	1428.00000	1428.00000
##	w[25,7]	w[26,7]	w[27,7]	w[28,7]	w[29,7]	w[30,7]
##	1238.40035	1428.00000	1428.00000	1428.00000	1428.00000	1428.00000
##	w[31,7]	w[32,7]	w[33,7]	w[34,7]	w[35,7]	w[36,7]
##	1428.00000	1428.00000	1428.00000	1428.00000	1428.00000	1428.00000

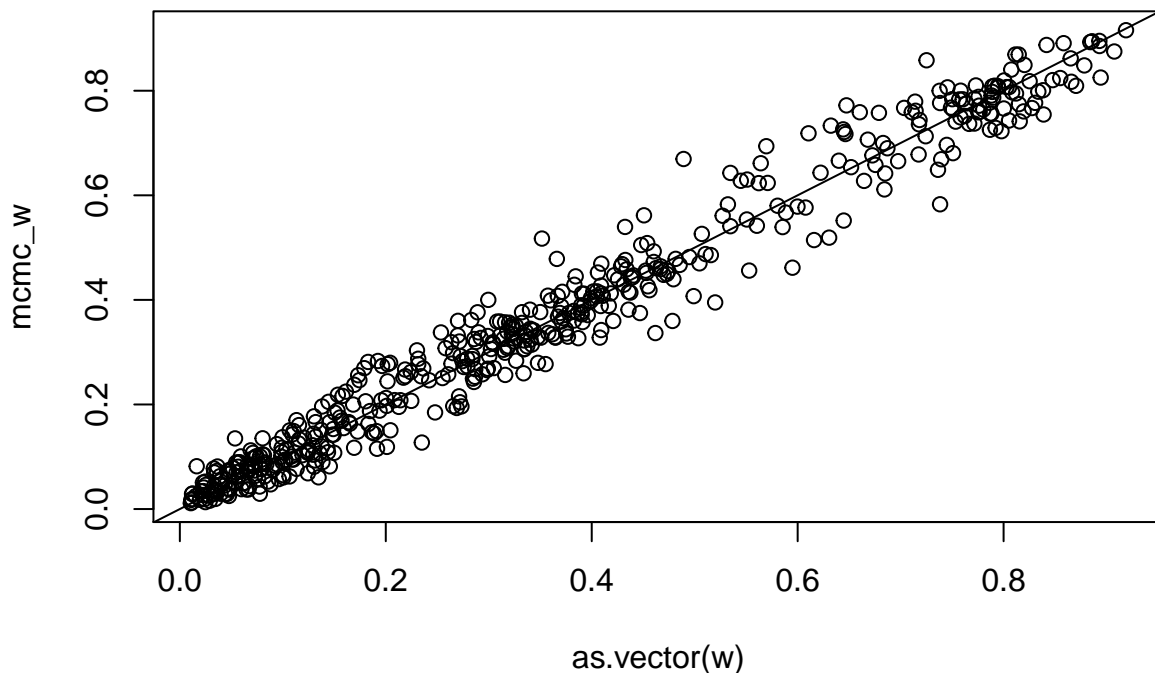
##	w[37,7]	w[38,7]	w[39,7]	w[40,7]	w[41,7]	w[42,7]
##	1428.00000	1279.47831	1615.94122	1428.00000	1428.00000	1272.73094
##	w[43,7]	w[44,7]	w[45,7]	w[46,7]	w[47,7]	w[48,7]
##	1428.00000	1428.00000	1354.41499	1677.45780	1428.00000	1428.00000
##	w[49,7]	w[50,7]	w[1,8]	w[2,8]	w[3,8]	w[4,8]
##	1428.00000	1428.00000	1428.00000	1583.52681	1428.00000	1428.00000
##	w[5,8]	w[6,8]	w[7,8]	w[8,8]	w[9,8]	w[10,8]
##	1428.00000	1428.00000	1428.00000	1290.49543	1428.00000	1428.00000
##	w[11,8]	w[12,8]	w[13,8]	w[14,8]	w[15,8]	w[16,8]
##	1428.00000	1428.00000	1428.00000	1541.36995	1428.00000	1428.00000
##	w[17,8]	w[18,8]	w[19,8]	w[20,8]	w[21,8]	w[22,8]
##	1428.00000	1428.00000	1282.30983	1321.64767	1428.00000	1321.23180
##	w[23,8]	w[24,8]	w[25,8]	w[26,8]	w[27,8]	w[28,8]
##	1428.00000	1428.00000	1705.78654	1428.00000	1428.00000	1428.00000
##	w[29,8]	w[30,8]	w[31,8]	w[32,8]	w[33,8]	w[34,8]
##	1428.00000	1428.00000	1496.17266	1724.29616	1428.00000	1133.08285
##	w[35,8]	w[36,8]	w[37,8]	w[38,8]	w[39,8]	w[40,8]
##	1086.14086	1428.00000	1180.03594	1179.11277	1428.00000	1885.60950
##	w[41,8]	w[42,8]	w[43,8]	w[44,8]	w[45,8]	w[46,8]
##	1428.00000	1298.80594	1284.83703	1428.00000	1428.00000	2189.57533
##	w[47,8]	w[48,8]	w[49,8]	w[50,8]	w[1,9]	w[2,9]
##	1428.00000	1333.23180	1428.00000	1428.00000	1281.71790	1428.00000
##	w[3,9]	w[4,9]	w[5,9]	w[6,9]	w[7,9]	w[8,9]
##	1428.00000	1428.00000	1428.00000	1428.00000	1428.00000	1501.21146
##	w[9,9]	w[10,9]	w[11,9]	w[12,9]	w[13,9]	w[14,9]
##	1428.00000	1428.00000	1428.00000	1552.76668	1428.00000	1428.00000
##	w[15,9]	w[16,9]	w[17,9]	w[18,9]	w[19,9]	w[20,9]
##	1428.00000	1428.00000	1428.00000	1428.00000	1428.00000	1428.00000
##	w[21,9]	w[22,9]	w[23,9]	w[24,9]	w[25,9]	w[26,9]
##	1428.00000	1428.00000	1293.92223	1374.87605	1428.00000	1428.00000
##	w[27,9]	w[28,9]	w[29,9]	w[30,9]	w[31,9]	w[32,9]
##	1428.00000	1298.48232	1428.00000	1428.00000	1249.67719	2017.25061
##	w[33,9]	w[34,9]	w[35,9]	w[36,9]	w[37,9]	w[38,9]
##	1273.65315	1428.00000	1428.00000	1428.00000	1428.00000	1403.77504
##	w[39,9]	w[40,9]	w[41,9]	w[42,9]	w[43,9]	w[44,9]
##	1428.00000	1216.85232	1428.00000	1428.00000	1428.00000	1674.16320
##	w[45,9]	w[46,9]	w[47,9]	w[48,9]	w[49,9]	w[50,9]
##	1428.00000	1428.00000	1428.00000	1211.02201	1925.73827	1428.00000
##	w[1,10]	w[2,10]	w[3,10]	w[4,10]	w[5,10]	w[6,10]
##	1288.44438	1425.98169	1010.89098	1428.00000	1428.00000	1555.93083
##	w[7,10]	w[8,10]	w[9,10]	w[10,10]	w[11,10]	w[12,10]
##	1428.00000	1428.00000	1238.56361	1428.00000	1185.35417	1428.00000
##	w[13,10]	w[14,10]	w[15,10]	w[16,10]	w[17,10]	w[18,10]
##	1428.00000	1428.00000	1428.00000	1252.91573	1255.23877	1428.00000
##	w[19,10]	w[20,10]	w[21,10]	w[22,10]	w[23,10]	w[24,10]
##	1054.48032	1296.02101	1428.00000	987.89276	1428.00000	1644.74213
##	w[25,10]	w[26,10]	w[27,10]	w[28,10]	w[29,10]	w[30,10]
##	1428.00000	1428.00000	1249.51205	1267.11951	1428.00000	1428.00000
##	w[31,10]	w[32,10]	w[33,10]	w[34,10]	w[35,10]	w[36,10]
##	1428.00000	1276.29429	1428.00000	1428.00000	1565.96681	1428.00000
##	w[37,10]	w[38,10]	w[39,10]	w[40,10]	w[41,10]	w[42,10]
##	1656.57639	1579.36391	1542.93001	1428.00000	1428.00000	1428.00000
##	w[43,10]	w[44,10]	w[45,10]	w[46,10]	w[47,10]	w[48,10]
##	1224.35250	1428.00000	1473.78947	1428.00000	1428.00000	1311.03801

```
## w[49,10] w[50,10] z[1] z[2] z[3] z[4]
## 1428.00000 1154.60606 0.00000 0.00000 0.00000 0.00000
## z[5] z[6] z[7] z[8] z[9] z[10]
## 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000
## z[11] z[12] z[13] z[14] z[15] z[16]
## 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000
## z[17] z[18] z[19] z[20] z[21] z[22]
## 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000
## z[23] z[24] z[25] z[26] z[27] z[28]
## 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000
## z[29] z[30] z[31] z[32] z[33] z[34]
## 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000
## z[35] z[36] z[37] z[38] z[39] z[40]
## 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000
## z[41] z[42] z[43] z[44] z[45] z[46]
## 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000
## z[47] z[48] z[49] z[50]
## 0.00000 0.00000 0.00000 0.00000
```

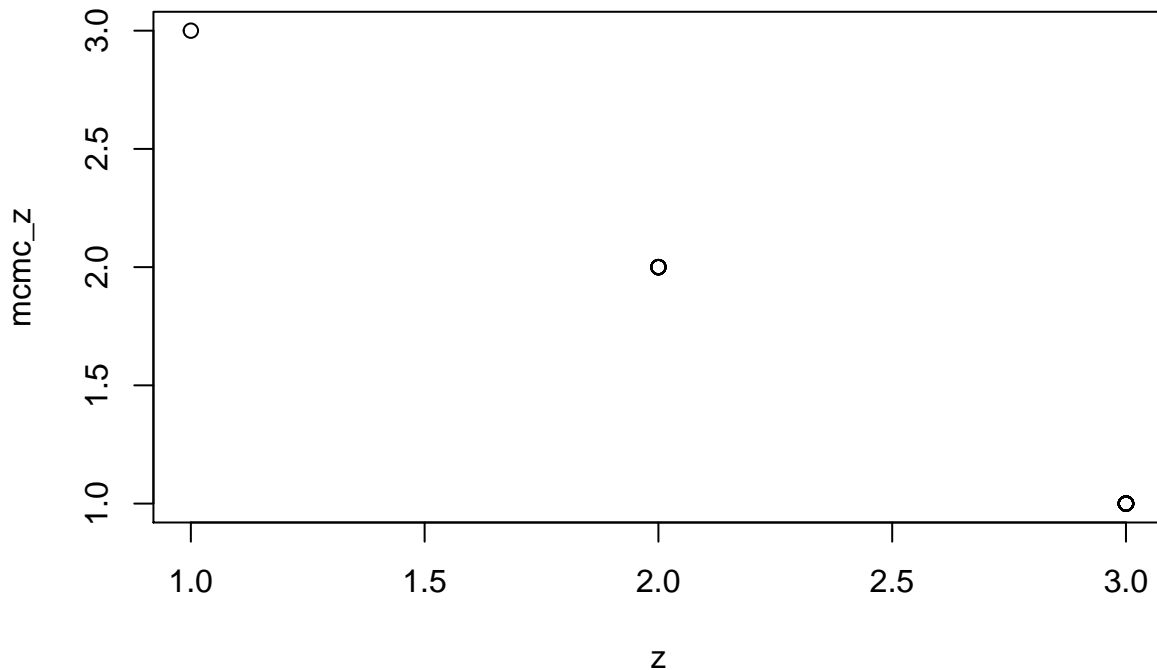
```
pdf(file.path(trace.dir, paste0(runName, "_trace.pdf")))
plot(samps)
dev.off()
```

```
## pdf
## 2
```

```
mcmc_vals <- s$statistics
mcmc_w <- mcmc_vals[substr(rownames(mcmc_vals), 1, 1) == "w", "Mean"]
plot(as.vector(w), mcmc_w, type = "p")
abline(a=0, b=1)
```



```
mcmc_z <- as.vector(mcmc_vals[substr(rownames(mcmc_vals), 1, 1) == "z", "Mean"])
#mcmc_z <- round(mcmc_z, 0)
plot(z, mcmc_z, type = "p")
```



```

mcmc_d <- mcmc_vals[substr(rownames(mcmc_vals), 1, 1) == "d", "Mean"]
mcmc_d <- matrix(mcmc_d, nrow=K)
mcmc_c <- mcmc_vals[substr(rownames(mcmc_vals), 1, 1) == "c", "Mean"]
mcmc_c <- matrix(mcmc_c, nrow=K)

p <- seq(0, 1, length = 100)
colors <- c("#000000", "#DCA200", "#8FA7ED", "#9D847A", "#A47901")
for (s in 1:S) {
  for (k in 1:K) {
    if (k == 1) {
      # plot mcmc mean
      plot(p, dbeta(p,
                    mcmc_d[k,s] * (mcmc_c[k,s] - 2) + 1,
                    (1 - mcmc_d[k,s]) * (mcmc_c[k,s] - 2) + 1),
           main = paste0("S", s),
           ylab = "density", xlab = "w", type = "l", col = colors[k],
           ylim = c(0, 20))
      # plot truth
      lines(p, dbeta(p, a.ordered[k,s], b.ordered[k,s]), type = "l", col = colors[k], lty=2)

      # add legend
      allU <- round(as.vector(rbind(mcmc_d[,s], U.ordered[,s])), digits = 2)
      legend(x = "topleft",
             legend = paste0(c("mcmc k", "true k"), rep(1:K, each=2)),
             col = colors[rep(1:K, each=2)],
             lty = rep(1:2, K),
             cex=0.8)
    } else {
      # plot mcmc mean U,V
      lines(p, dbeta(p, mcmc_d[k,s] * (mcmc_c[k,s] - 2) + 1,
                    (1 - mcmc_d[k,s]) * (mcmc_c[k,s] - 2) + 1),
            type = "l", col = colors[k])
    }
  }
}

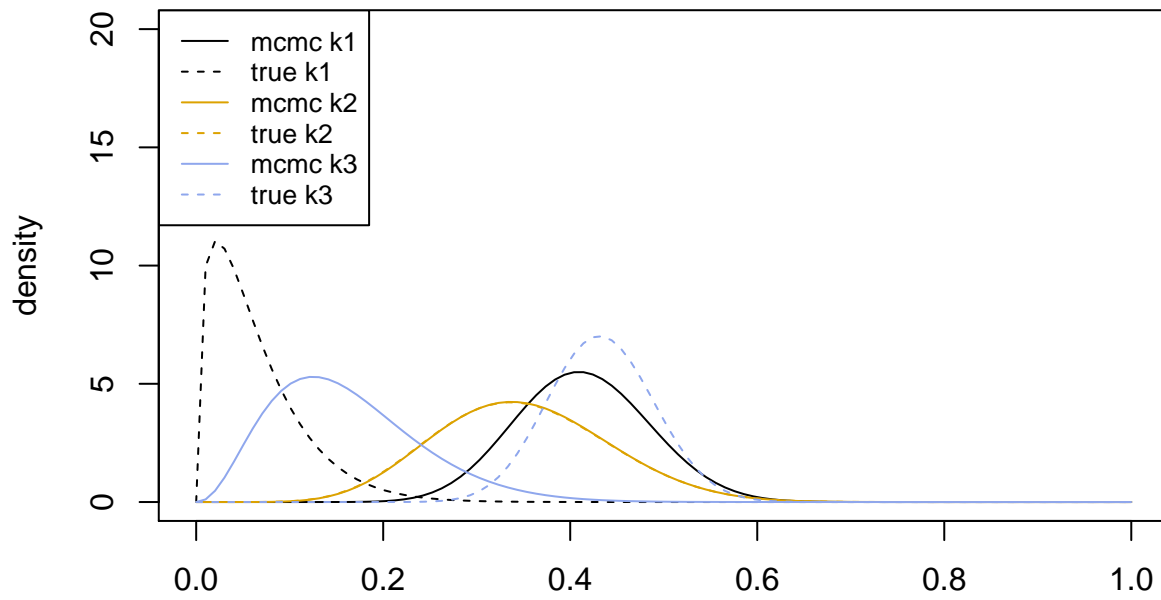
```

```

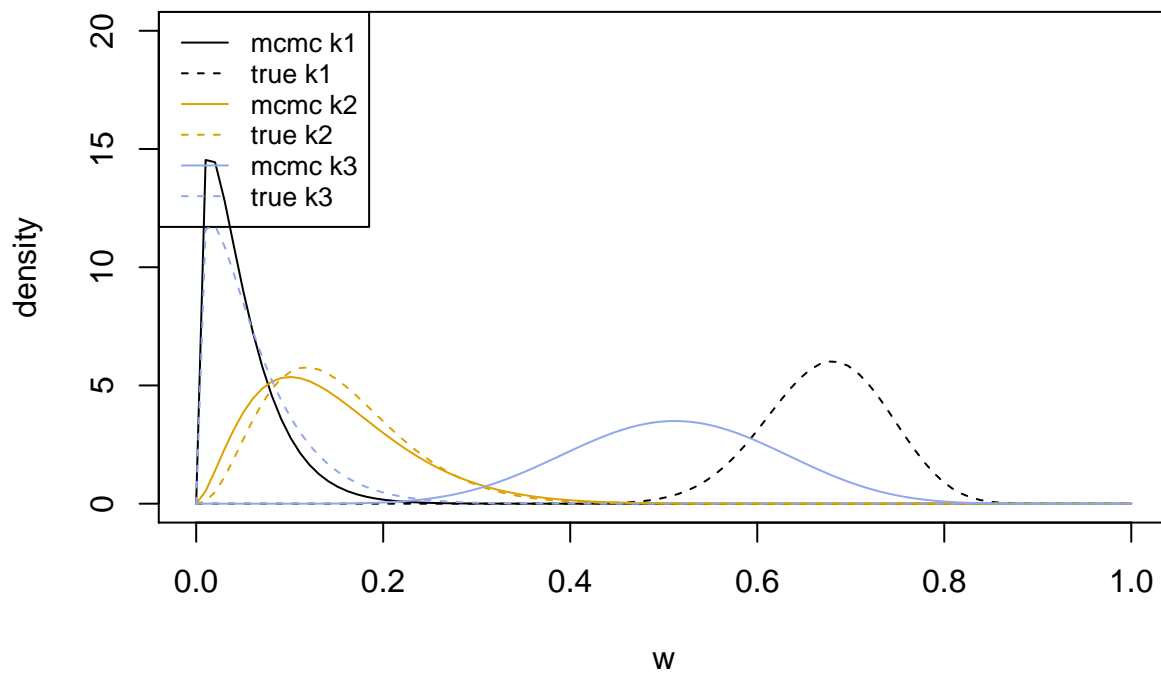
# plot truth
lines(p, dbeta(p, a.ordered[k,s], b.ordered[k,s]), type = "l", col = colors[k], lty=2)
}
}
}

```

**S1**

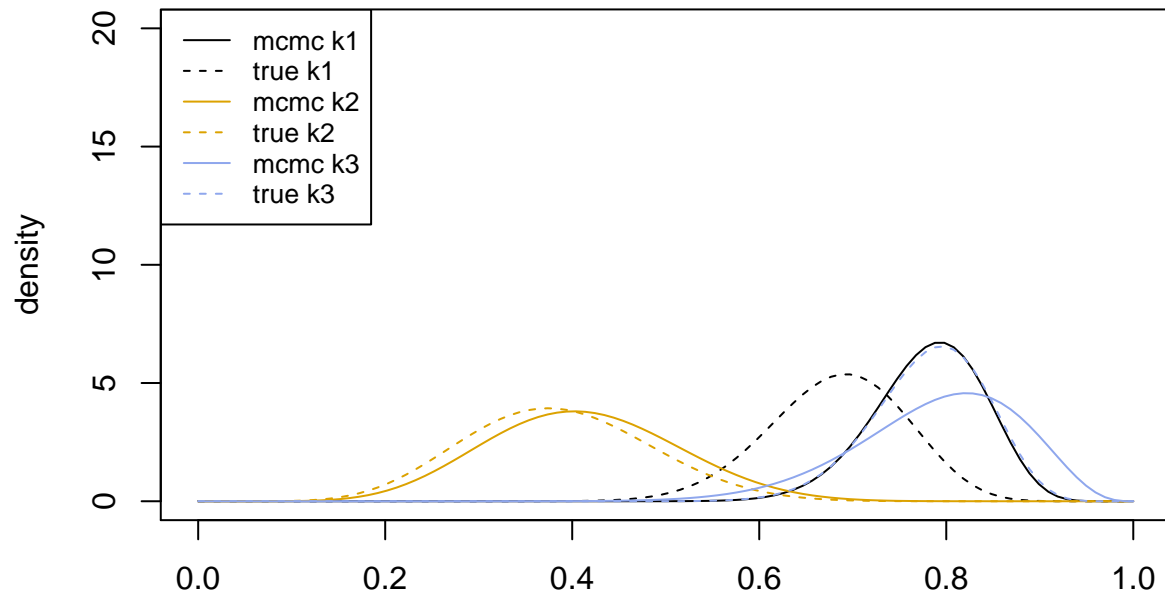


**S2**

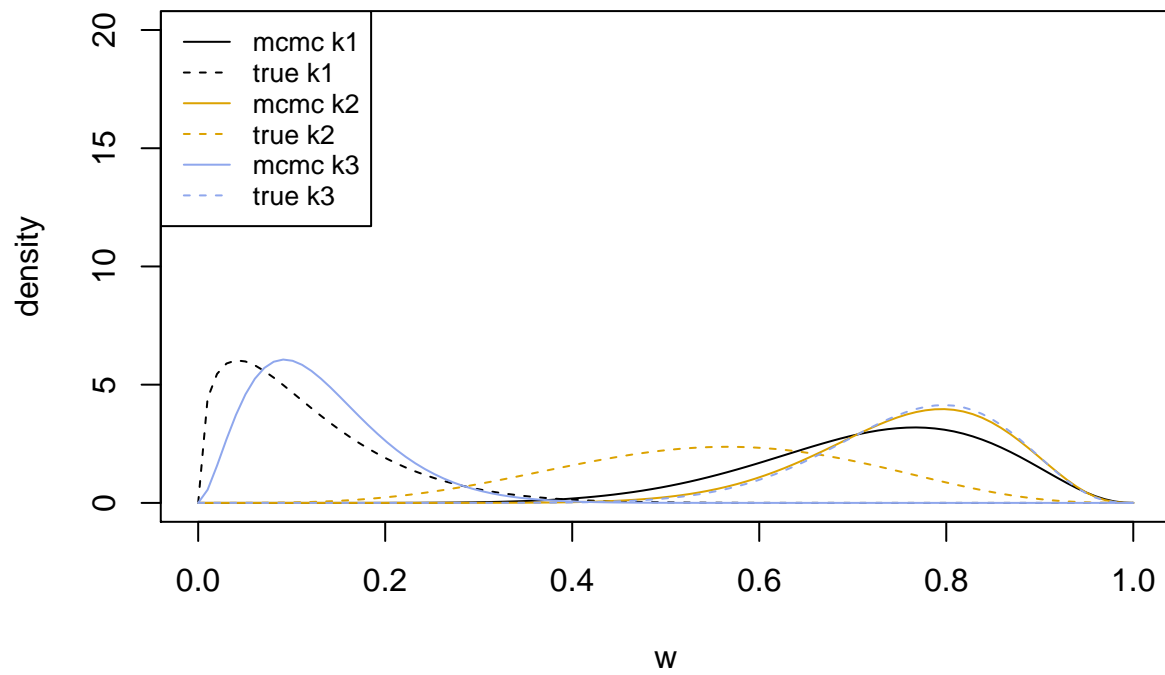




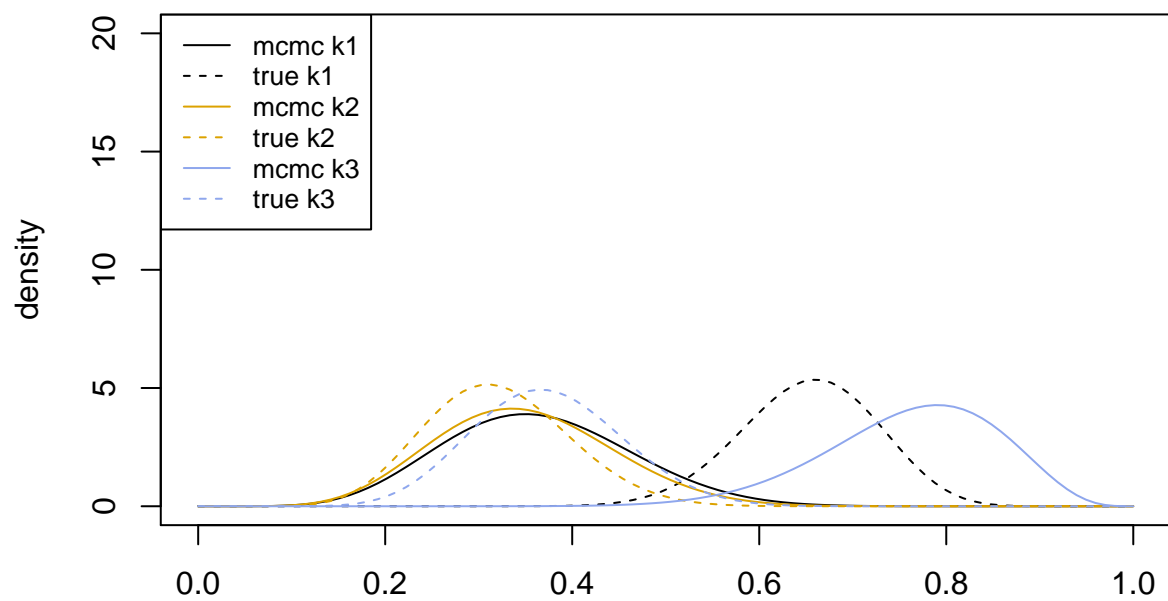
**S3**



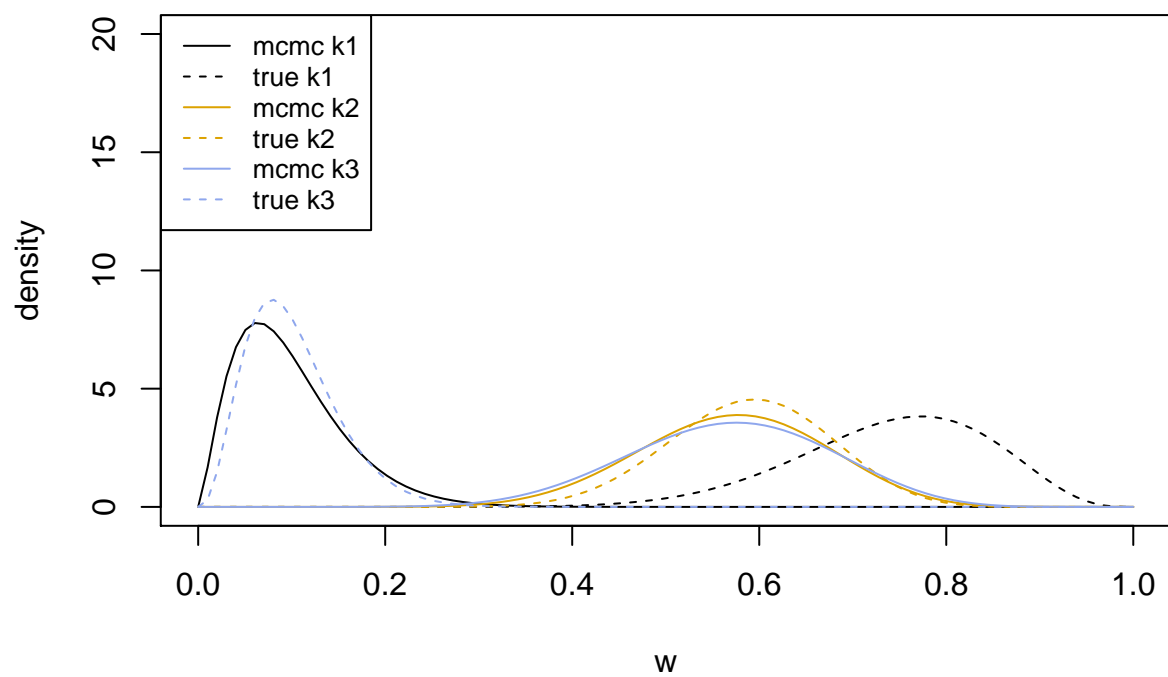
**S4**



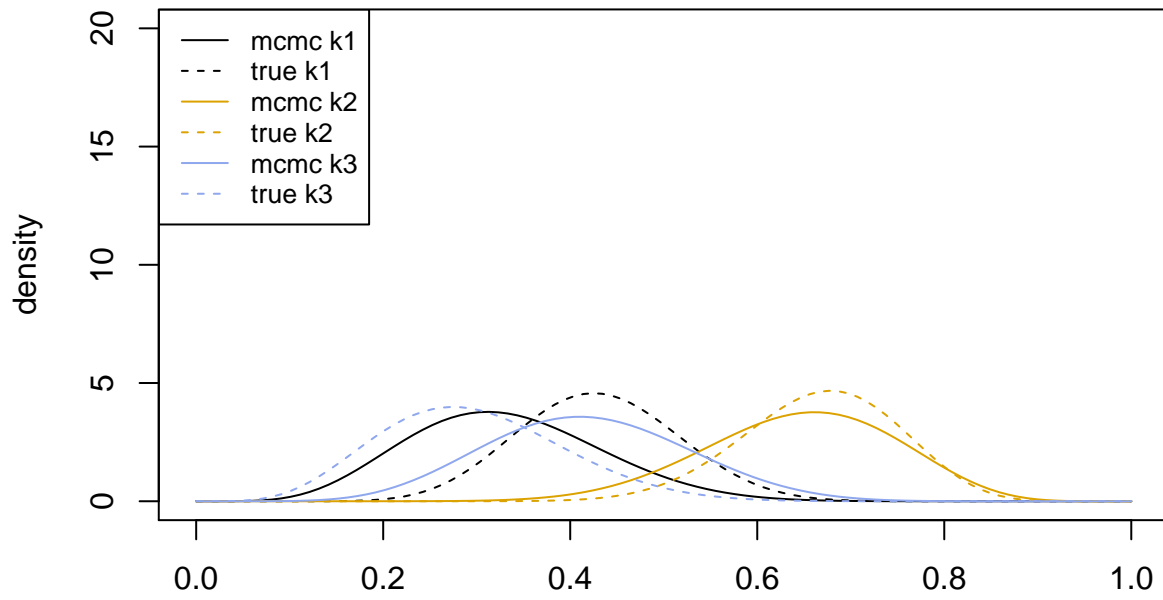
**S5**



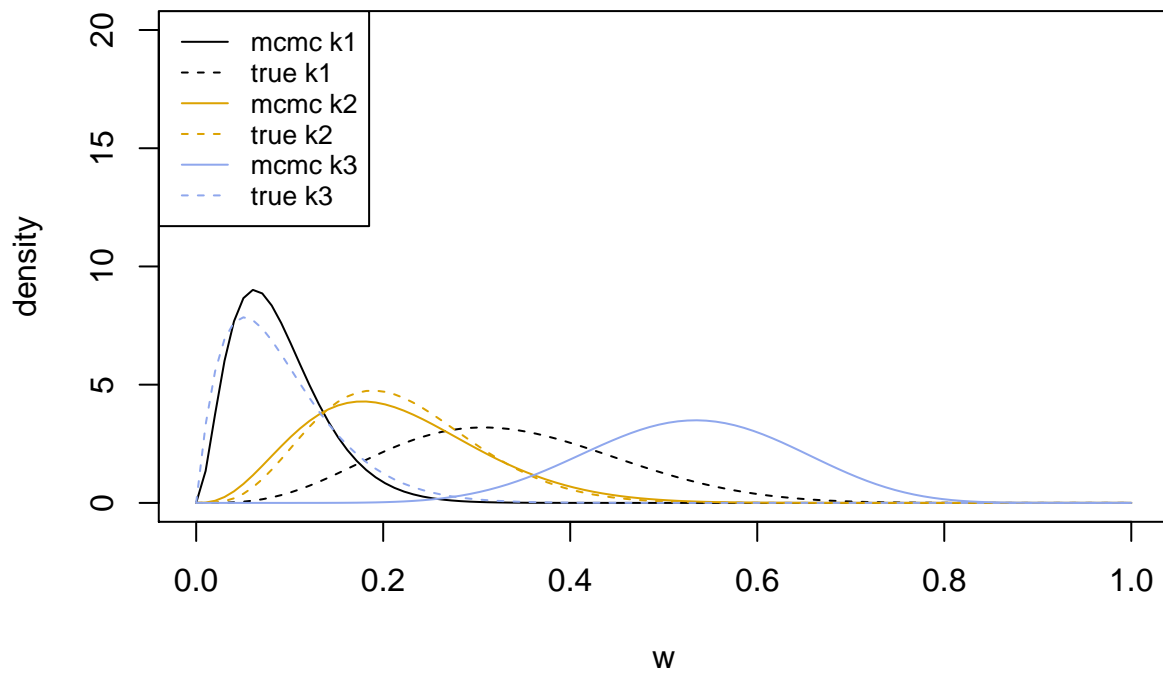
**S6**



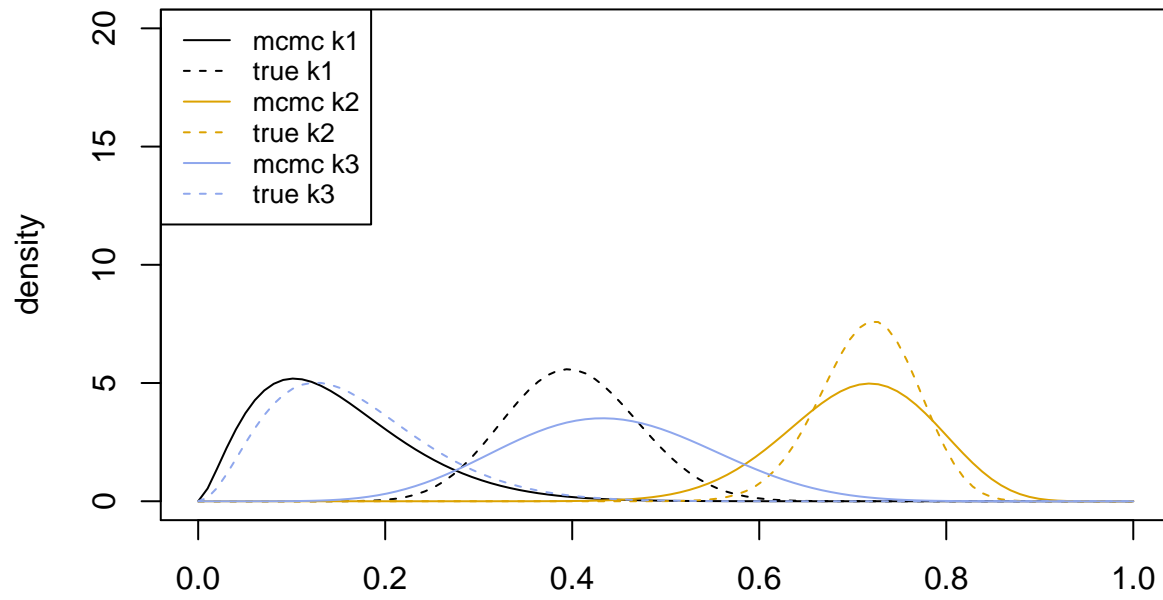
**S7**



**S8**



**S9**



**S10**

