

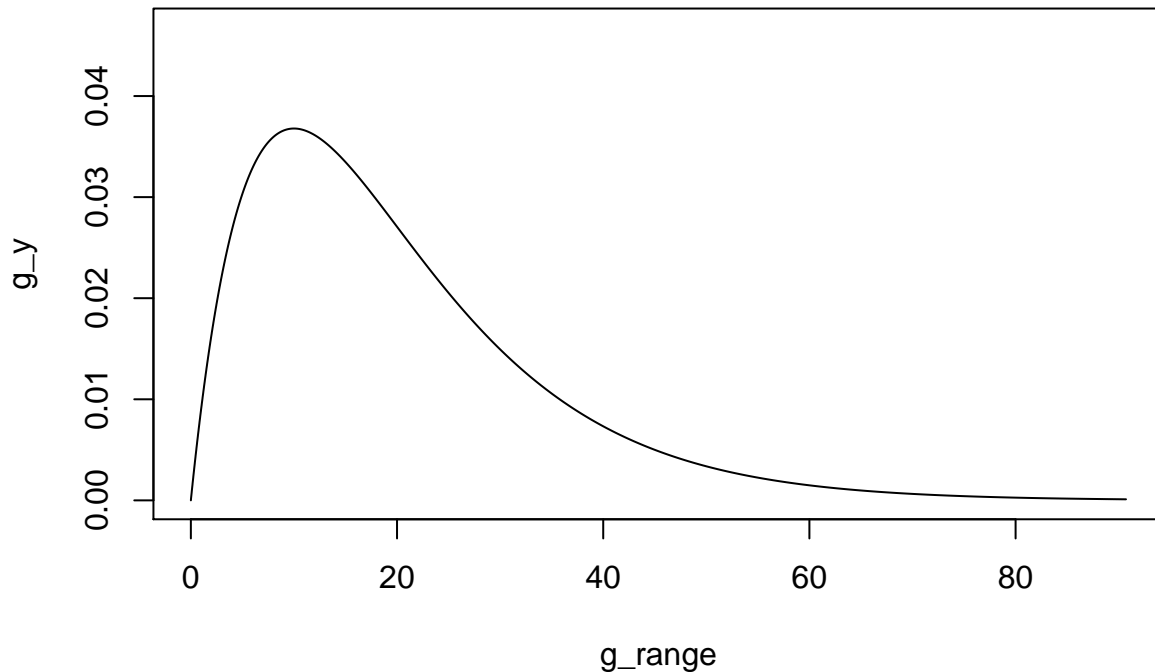
## Version 3: 4 clusters; Start chain at true values

### Simulate data

```
I <- 50
K <- 4
S <- 10

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

avrg <- a_gamma * b_gamma
std.dv <- sqrt(a_gamma*b_gamma^2)
g_range = seq(0, avrg + 5*std.dv, 0.01)
g_y = dgamma(g_range, a_gamma, rate = 1/b_gamma)
plot(g_range, g_y, type = "l", ylim=c(0, max(g_y) + 0.01))
```



```
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_uv_unif.jags")

test.data <- list("I" = I, "S" = S, "K" = K,
                 "y" = y, "n" = n,
                 "m" = m, "tcn" = tcn)
trueVals <- list(z = z, w = w, U = U.ordered, V = V.ordered)
jags.m <- jags.model(jags.file, test.data,
                    n.chains = 1,
                    inits = trueVals)

## Compiling model graph
##   Resolving undeclared variables
##   Allocating nodes
## Graph information:
##   Observed stochastic nodes: 500
##   Unobserved stochastic nodes: 631
##   Total graph size: 8481
##
## Initializing model

params <- c("z", "w", "U", "V")
samps <- coda.samples(jags.m, params, n.iter=5000, thin=5)

```

```
s <- summary(samps)
effectiveSize(samps)
```

```
##      U[1,1]      U[2,1]      U[3,1]      U[4,1]      U[1,2]      U[2,2]      U[3,2]
## 828.3388 1330.9424 679.8954 586.0822 1004.3226 903.6236 1000.0000
##      U[4,2]      U[1,3]      U[2,3]      U[3,3]      U[4,3]      U[1,4]      U[2,4]
## 1000.0000 794.9963 1000.0000 862.2630 1000.0000 1000.0000 1000.0000
##      U[3,4]      U[4,4]      U[1,5]      U[2,5]      U[3,5]      U[4,5]      U[1,6]
## 1000.0000 746.5097 838.7273 826.5432 1000.0000 904.9334 592.7700
##      U[2,6]      U[3,6]      U[4,6]      U[1,7]      U[2,7]      U[3,7]      U[4,7]
## 864.9360 1000.0000 1000.0000 910.2238 907.6897 765.1825 835.0261
##      U[1,8]      U[2,8]      U[3,8]      U[4,8]      U[1,9]      U[2,9]      U[3,9]
## 1000.0000 876.3775 1000.0000 855.9821 1000.0000 870.5650 1000.0000
##      U[4,9]      U[1,10]      U[2,10]      U[3,10]      U[4,10]      V[1,1]      V[2,1]
## 1000.0000 1000.0000 1000.0000 1000.0000 854.2172 802.0715 852.1051
##      V[3,1]      V[4,1]      V[1,2]      V[2,2]      V[3,2]      V[4,2]      V[1,3]
## 640.5160 729.0925 795.9313 896.4438 879.5653 829.3079 727.1059
##      V[2,3]      V[3,3]      V[4,3]      V[1,4]      V[2,4]      V[3,4]      V[4,4]
## 839.9765 1000.0000 821.6309 812.0041 790.5291 810.6871 671.2572
##      V[1,5]      V[2,5]      V[3,5]      V[4,5]      V[1,6]      V[2,6]      V[3,6]
## 885.8973 706.0172 1000.0000 1058.5763 914.4505 597.3649 874.1372
##      V[4,6]      V[1,7]      V[2,7]      V[3,7]      V[4,7]      V[1,8]      V[2,8]
## 793.7696 840.6191 844.2624 766.3423 892.0502 1000.0000 744.4582
##      V[3,8]      V[4,8]      V[1,9]      V[2,9]      V[3,9]      V[4,9]      V[1,10]
## 1000.0000 671.0632 1075.9337 723.4564 827.6102 747.7744 761.6655
##      V[2,10]      V[3,10]      V[4,10]      w[1,1]      w[2,1]      w[3,1]      w[4,1]
## 537.1684 984.7793 1000.0000 1000.0000 1000.0000 1000.0000 1000.0000
##      w[5,1]      w[6,1]      w[7,1]      w[8,1]      w[9,1]      w[10,1]      w[11,1]
## 1000.0000 1000.0000 866.8421 1040.1012 810.4503 1000.0000 1000.0000
##      w[12,1]      w[13,1]      w[14,1]      w[15,1]      w[16,1]      w[17,1]      w[18,1]
## 913.0165 674.5287 894.8254 1257.5767 862.4968 1000.0000 1000.0000
##      w[19,1]      w[20,1]      w[21,1]      w[22,1]      w[23,1]      w[24,1]      w[25,1]
## 1000.0000 1000.0000 1038.5353 1100.3607 1000.0000 1000.0000 794.1007
##      w[26,1]      w[27,1]      w[28,1]      w[29,1]      w[30,1]      w[31,1]      w[32,1]
## 1000.0000 907.1234 1000.0000 1000.0000 1000.0000 1329.8633 1263.7009
##      w[33,1]      w[34,1]      w[35,1]      w[36,1]      w[37,1]      w[38,1]      w[39,1]
## 1127.1324 1000.0000 497.7733 867.8652 1000.0000 1000.0000 1104.6735
##      w[40,1]      w[41,1]      w[42,1]      w[43,1]      w[44,1]      w[45,1]      w[46,1]
## 1145.8930 1000.0000 904.0422 1267.5863 1000.0000 1000.0000 815.3547
##      w[47,1]      w[48,1]      w[49,1]      w[50,1]      w[1,2]      w[2,2]      w[3,2]
## 1000.0000 1000.0000 1000.0000 1059.5347 1264.1516 1000.0000 1000.0000
##      w[4,2]      w[5,2]      w[6,2]      w[7,2]      w[8,2]      w[9,2]      w[10,2]
## 1000.0000 1000.0000 1000.0000 1000.0000 1000.0000 1000.0000 1000.0000
##      w[11,2]      w[12,2]      w[13,2]      w[14,2]      w[15,2]      w[16,2]      w[17,2]
## 1000.0000 1000.0000 1000.0000 1000.0000 1000.0000 1000.0000 1000.0000
##      w[18,2]      w[19,2]      w[20,2]      w[21,2]      w[22,2]      w[23,2]      w[24,2]
## 882.0169 1000.0000 1000.0000 1000.0000 1000.0000 1000.0000 867.0744
##      w[25,2]      w[26,2]      w[27,2]      w[28,2]      w[29,2]      w[30,2]      w[31,2]
## 1000.0000 1000.0000 1000.0000 1000.0000 1000.0000 1000.0000 865.8043
##      w[32,2]      w[33,2]      w[34,2]      w[35,2]      w[36,2]      w[37,2]      w[38,2]
## 1000.0000 1000.0000 1000.0000 2146.6042 1000.0000 1000.0000 1000.0000
##      w[39,2]      w[40,2]      w[41,2]      w[42,2]      w[43,2]      w[44,2]      w[45,2]
## 1000.0000 1000.0000 1000.0000 1000.0000 805.9751 1000.0000 1000.0000
##      w[46,2]      w[47,2]      w[48,2]      w[49,2]      w[50,2]      w[1,3]      w[2,3]
```

##	1000.0000	1000.0000	1298.8881	1017.5246	821.8198	1000.0000	1000.0000
##	w[3,3]	w[4,3]	w[5,3]	w[6,3]	w[7,3]	w[8,3]	w[9,3]
##	1000.0000	1000.0000	1000.0000	1000.0000	1000.0000	1000.0000	1000.0000
##	w[10,3]	w[11,3]	w[12,3]	w[13,3]	w[14,3]	w[15,3]	w[16,3]
##	1000.0000	1081.6434	1000.0000	844.9712	896.0154	1000.0000	1000.0000
##	w[17,3]	w[18,3]	w[19,3]	w[20,3]	w[21,3]	w[22,3]	w[23,3]
##	1000.0000	1000.0000	1101.2529	1041.7424	1000.0000	1000.0000	1000.0000
##	w[24,3]	w[25,3]	w[26,3]	w[27,3]	w[28,3]	w[29,3]	w[30,3]
##	894.0988	1000.0000	1000.0000	1015.7897	1000.0000	883.5914	1000.0000
##	w[31,3]	w[32,3]	w[33,3]	w[34,3]	w[35,3]	w[36,3]	w[37,3]
##	1000.0000	1000.0000	1000.0000	1000.0000	1000.0000	1000.0000	558.8619
##	w[38,3]	w[39,3]	w[40,3]	w[41,3]	w[42,3]	w[43,3]	w[44,3]
##	1000.0000	1000.0000	849.8807	1000.0000	870.8667	1000.0000	1010.3925
##	w[45,3]	w[46,3]	w[47,3]	w[48,3]	w[49,3]	w[50,3]	w[1,4]
##	1000.0000	1000.0000	817.0887	1000.0000	915.2395	1000.0000	1194.8266
##	w[2,4]	w[3,4]	w[4,4]	w[5,4]	w[6,4]	w[7,4]	w[8,4]
##	799.0264	1000.0000	1000.0000	1000.0000	979.5567	672.7566	729.1112
##	w[9,4]	w[10,4]	w[11,4]	w[12,4]	w[13,4]	w[14,4]	w[15,4]
##	1000.0000	1168.5352	1000.0000	1140.9665	1000.0000	1000.0000	1000.0000
##	w[16,4]	w[17,4]	w[18,4]	w[19,4]	w[20,4]	w[21,4]	w[22,4]
##	1188.8089	1000.0000	1000.0000	1941.7390	1000.0000	1000.0000	1000.0000
##	w[23,4]	w[24,4]	w[25,4]	w[26,4]	w[27,4]	w[28,4]	w[29,4]
##	1000.0000	1000.0000	665.2360	1000.0000	805.6928	883.2733	1000.0000
##	w[30,4]	w[31,4]	w[32,4]	w[33,4]	w[34,4]	w[35,4]	w[36,4]
##	1112.2996	1000.0000	827.7732	1000.0000	1000.0000	1000.0000	1000.0000
##	w[37,4]	w[38,4]	w[39,4]	w[40,4]	w[41,4]	w[42,4]	w[43,4]
##	1000.0000	1000.0000	1000.0000	1000.0000	1000.0000	710.7285	1000.0000
##	w[44,4]	w[45,4]	w[46,4]	w[47,4]	w[48,4]	w[49,4]	w[50,4]
##	1000.0000	1000.0000	1021.8915	811.3909	1124.0566	872.5541	1000.0000
##	w[1,5]	w[2,5]	w[3,5]	w[4,5]	w[5,5]	w[6,5]	w[7,5]
##	753.3727	1000.0000	1000.0000	782.1813	1000.0000	1000.0000	871.5284
##	w[8,5]	w[9,5]	w[10,5]	w[11,5]	w[12,5]	w[13,5]	w[14,5]
##	1000.0000	1000.0000	886.5214	1000.0000	1000.0000	1148.8248	907.5538
##	w[15,5]	w[16,5]	w[17,5]	w[18,5]	w[19,5]	w[20,5]	w[21,5]
##	949.0860	909.5528	1000.0000	1000.0000	1000.0000	875.3547	1000.0000
##	w[22,5]	w[23,5]	w[24,5]	w[25,5]	w[26,5]	w[27,5]	w[28,5]
##	1000.0000	1000.0000	1000.0000	1174.0999	1000.0000	1000.0000	1000.0000
##	w[29,5]	w[30,5]	w[31,5]	w[32,5]	w[33,5]	w[34,5]	w[35,5]
##	1000.0000	1000.0000	1000.0000	1000.0000	1000.0000	1086.7863	1000.0000
##	w[36,5]	w[37,5]	w[38,5]	w[39,5]	w[40,5]	w[41,5]	w[42,5]
##	1000.0000	1000.0000	1000.0000	1000.0000	1000.0000	851.2495	1000.0000
##	w[43,5]	w[44,5]	w[45,5]	w[46,5]	w[47,5]	w[48,5]	w[49,5]
##	1000.0000	1000.0000	1000.0000	858.4949	1000.0000	1000.0000	1000.0000
##	w[50,5]	w[1,6]	w[2,6]	w[3,6]	w[4,6]	w[5,6]	w[6,6]
##	1000.0000	1000.0000	1000.0000	791.3564	1000.0000	1000.0000	1000.0000
##	w[7,6]	w[8,6]	w[9,6]	w[10,6]	w[11,6]	w[12,6]	w[13,6]
##	952.9478	1000.0000	1000.0000	1115.8767	901.3279	897.4264	1000.0000
##	w[14,6]	w[15,6]	w[16,6]	w[17,6]	w[18,6]	w[19,6]	w[20,6]
##	1000.0000	1000.0000	1104.0765	993.9058	910.1479	1000.0000	1000.0000
##	w[21,6]	w[22,6]	w[23,6]	w[24,6]	w[25,6]	w[26,6]	w[27,6]
##	1000.0000	1000.0000	1000.0000	887.5962	1000.0000	1000.0000	1000.0000
##	w[28,6]	w[29,6]	w[30,6]	w[31,6]	w[32,6]	w[33,6]	w[34,6]
##	1000.0000	752.0136	1000.0000	1000.0000	1055.1141	803.5823	1034.9562
##	w[35,6]	w[36,6]	w[37,6]	w[38,6]	w[39,6]	w[40,6]	w[41,6]

```

## 1000.0000 1000.0000 1000.0000 1000.0000 1000.0000 1000.0000 1000.0000
## w[42,6] w[43,6] w[44,6] w[45,6] w[46,6] w[47,6] w[48,6]
## 1000.0000 1000.0000 1000.0000 845.3637 1000.0000 1312.8278 1000.0000
## w[49,6] w[50,6] w[1,7] w[2,7] w[3,7] w[4,7] w[5,7]
## 1000.0000 1000.0000 1000.0000 1000.0000 1000.0000 1131.8346 1000.0000
## w[6,7] w[7,7] w[8,7] w[9,7] w[10,7] w[11,7] w[12,7]
## 1000.0000 1000.0000 1189.9277 1000.0000 1000.0000 1000.0000 777.1369
## w[13,7] w[14,7] w[15,7] w[16,7] w[17,7] w[18,7] w[19,7]
## 1359.9442 1000.0000 1000.0000 1000.0000 1000.0000 1000.0000 1000.0000
## w[20,7] w[21,7] w[22,7] w[23,7] w[24,7] w[25,7] w[26,7]
## 1000.0000 1000.0000 1000.0000 1123.1926 1000.0000 1000.0000 1000.0000
## w[27,7] w[28,7] w[29,7] w[30,7] w[31,7] w[32,7] w[33,7]
## 1000.0000 863.0827 1000.0000 1000.0000 1000.0000 886.5207 1000.0000
## w[34,7] w[35,7] w[36,7] w[37,7] w[38,7] w[39,7] w[40,7]
## 1000.0000 1000.0000 1000.0000 1000.0000 1000.0000 1000.0000 1000.0000
## w[41,7] w[42,7] w[43,7] w[44,7] w[45,7] w[46,7] w[47,7]
## 1133.4427 1000.0000 1000.0000 1000.0000 1000.0000 1000.0000 1000.0000
## w[48,7] w[49,7] w[50,7] w[1,8] w[2,8] w[3,8] w[4,8]
## 892.8032 902.5615 1000.0000 1000.0000 986.8224 1000.0000 888.8992
## w[5,8] w[6,8] w[7,8] w[8,8] w[9,8] w[10,8] w[11,8]
## 888.8406 1000.0000 1000.0000 1000.0000 1000.0000 1000.0000 1000.0000
## w[12,8] w[13,8] w[14,8] w[15,8] w[16,8] w[17,8] w[18,8]
## 1000.0000 1000.0000 768.4486 1000.0000 1000.0000 1000.0000 1000.0000
## w[19,8] w[20,8] w[21,8] w[22,8] w[23,8] w[24,8] w[25,8]
## 1000.0000 1000.0000 1000.0000 1000.0000 1000.0000 1000.0000 1000.0000
## w[26,8] w[27,8] w[28,8] w[29,8] w[30,8] w[31,8] w[32,8]
## 1000.0000 1000.0000 737.5229 1000.0000 980.1502 866.9399 1000.0000
## w[33,8] w[34,8] w[35,8] w[36,8] w[37,8] w[38,8] w[39,8]
## 1000.0000 885.1394 1000.0000 845.8308 1000.0000 1469.3827 889.4925
## w[40,8] w[41,8] w[42,8] w[43,8] w[44,8] w[45,8] w[46,8]
## 1140.9200 889.0273 1000.0000 1000.0000 1000.0000 1000.0000 1000.0000
## w[47,8] w[48,8] w[49,8] w[50,8] w[1,9] w[2,9] w[3,9]
## 1000.0000 1000.0000 1000.0000 1000.0000 908.0583 1112.2412 1000.0000
## w[4,9] w[5,9] w[6,9] w[7,9] w[8,9] w[9,9] w[10,9]
## 1000.0000 1154.8351 1000.0000 1000.0000 1000.0000 1000.0000 1000.0000
## w[11,9] w[12,9] w[13,9] w[14,9] w[15,9] w[16,9] w[17,9]
## 1000.0000 1203.4773 1055.7107 1000.0000 1000.0000 1000.0000 1000.0000
## w[18,9] w[19,9] w[20,9] w[21,9] w[22,9] w[23,9] w[24,9]
## 1000.0000 1000.0000 1059.5786 1000.0000 1218.5570 1000.0000 1000.0000
## w[25,9] w[26,9] w[27,9] w[28,9] w[29,9] w[30,9] w[31,9]
## 1106.9563 875.6799 1000.0000 652.5190 1000.0000 923.1082 1099.4893
## w[32,9] w[33,9] w[34,9] w[35,9] w[36,9] w[37,9] w[38,9]
## 1000.0000 1000.0000 1000.0000 1000.0000 1000.0000 1000.0000 1118.3261
## w[39,9] w[40,9] w[41,9] w[42,9] w[43,9] w[44,9] w[45,9]
## 1000.0000 1119.1146 1000.0000 1000.0000 1000.0000 1000.0000 895.0778
## w[46,9] w[47,9] w[48,9] w[49,9] w[50,9] w[1,10] w[2,10]
## 1000.0000 1000.0000 1000.0000 1000.0000 1000.0000 890.0511 1000.0000
## w[3,10] w[4,10] w[5,10] w[6,10] w[7,10] w[8,10] w[9,10]
## 1000.0000 1000.0000 1000.0000 1000.0000 856.8551 1208.5651 1000.0000
## w[10,10] w[11,10] w[12,10] w[13,10] w[14,10] w[15,10] w[16,10]
## 747.9959 1000.0000 902.9806 1000.0000 1000.0000 799.2997 1000.0000
## w[17,10] w[18,10] w[19,10] w[20,10] w[21,10] w[22,10] w[23,10]
## 1028.8048 1000.0000 1105.6759 1000.0000 1102.2371 1131.1374 908.6436
## w[24,10] w[25,10] w[26,10] w[27,10] w[28,10] w[29,10] w[30,10]

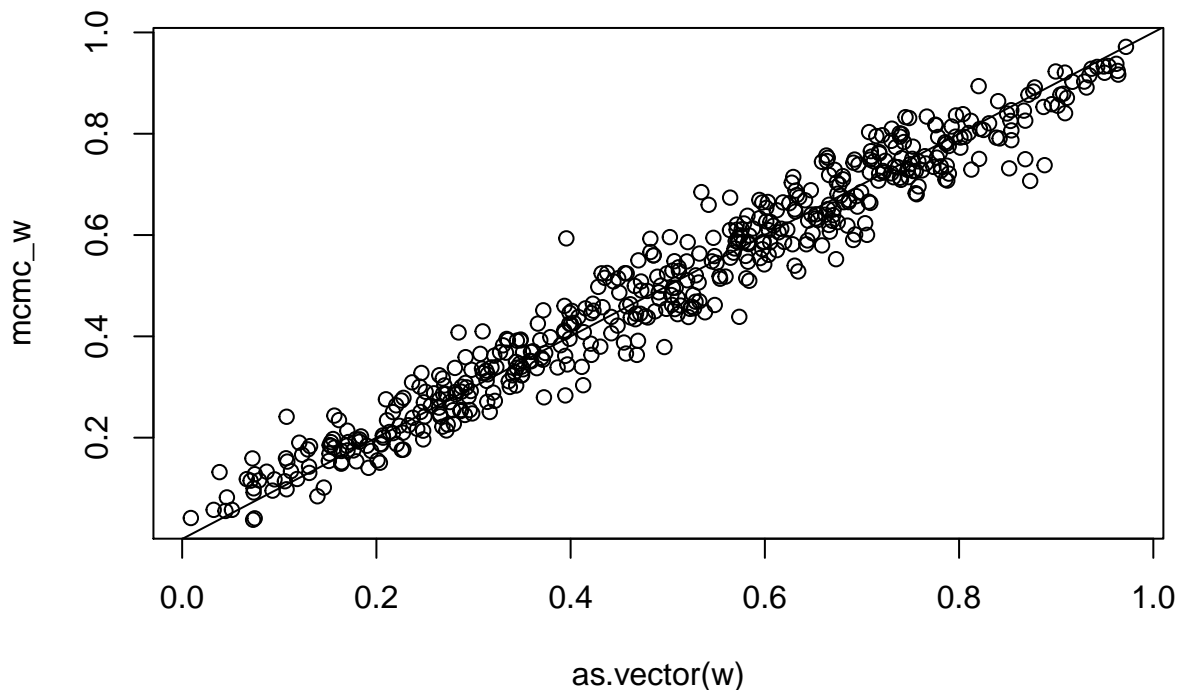
```

```
## 1000.0000 1000.0000 1000.0000 1000.0000 1000.0000 962.6664 1000.0000
## w[31,10] w[32,10] w[33,10] w[34,10] w[35,10] w[36,10] w[37,10]
## 1000.0000 1000.0000 1000.0000 1000.0000 1325.8572 1000.0000 1000.0000
## w[38,10] w[39,10] w[40,10] w[41,10] w[42,10] w[43,10] w[44,10]
## 1000.0000 862.1905 1000.0000 1000.0000 1000.0000 1000.0000 1000.0000
## w[45,10] w[46,10] w[47,10] w[48,10] w[49,10] w[50,10] z[1]
## 1000.0000 1000.0000 875.1283 1000.0000 1000.0000 975.8665 0.0000
## z[2] z[3] z[4] z[5] z[6] z[7] z[8]
## 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000
## z[9] z[10] z[11] z[12] z[13] z[14] z[15]
## 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000
## z[16] z[17] z[18] z[19] z[20] z[21] z[22]
## 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000
## z[23] z[24] z[25] z[26] z[27] z[28] z[29]
## 0.0000 0.0000 0.0000 1000.0000 0.0000 1000.0000 0.0000
## z[30] z[31] z[32] z[33] z[34] z[35] z[36]
## 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 312.3808
## z[37] z[38] z[39] z[40] z[41] z[42] z[43]
## 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000
## z[44] z[45] z[46] z[47] z[48] z[49] z[50]
## 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000
```

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

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

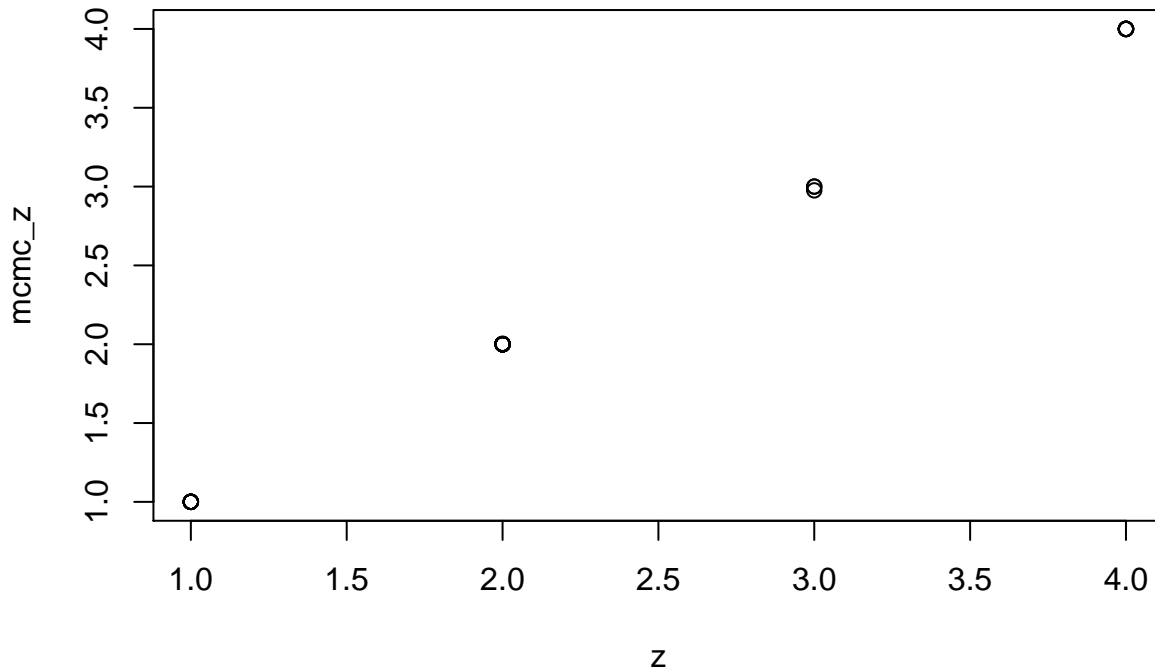
```
mcmc_vals <- s$statistics
mcmc_w <- mcmc_vals[substr(rownames(mcmc_vals), 1, 1) == "w", "Mean"]
plot(as.vector(w), mcmc_w, type = "p")
abline(a=0, b=1)
```



```

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_U <- mcmc_vals[substr(rownames(mcmc_vals), 1, 1) == "U", "Mean"]
mcmc_U <- matrix(mcmc_U, nrow=K)
mcmc_V <- mcmc_vals[substr(rownames(mcmc_vals), 1, 1) == "V", "Mean"]
mcmc_V <- matrix(mcmc_V, 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 U,V
      plot(p, dbeta(p, mcmc_U[k,s] * mcmc_V[k,s], (1-mcmc_U[k,s])*mcmc_V[k,s]),
            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
      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_U[k,s] * mcmc_V[k,s], (1-mcmc_U[k,s])*mcmc_V[k,s]),
            type = "l", col = colors[k])
      # plot truth

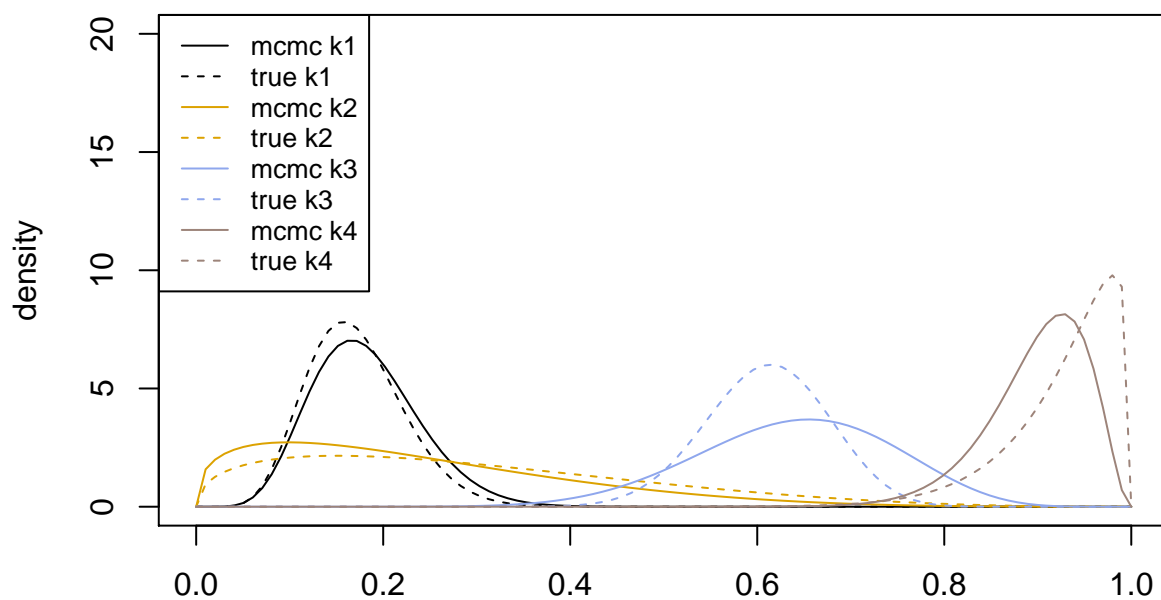
```

```

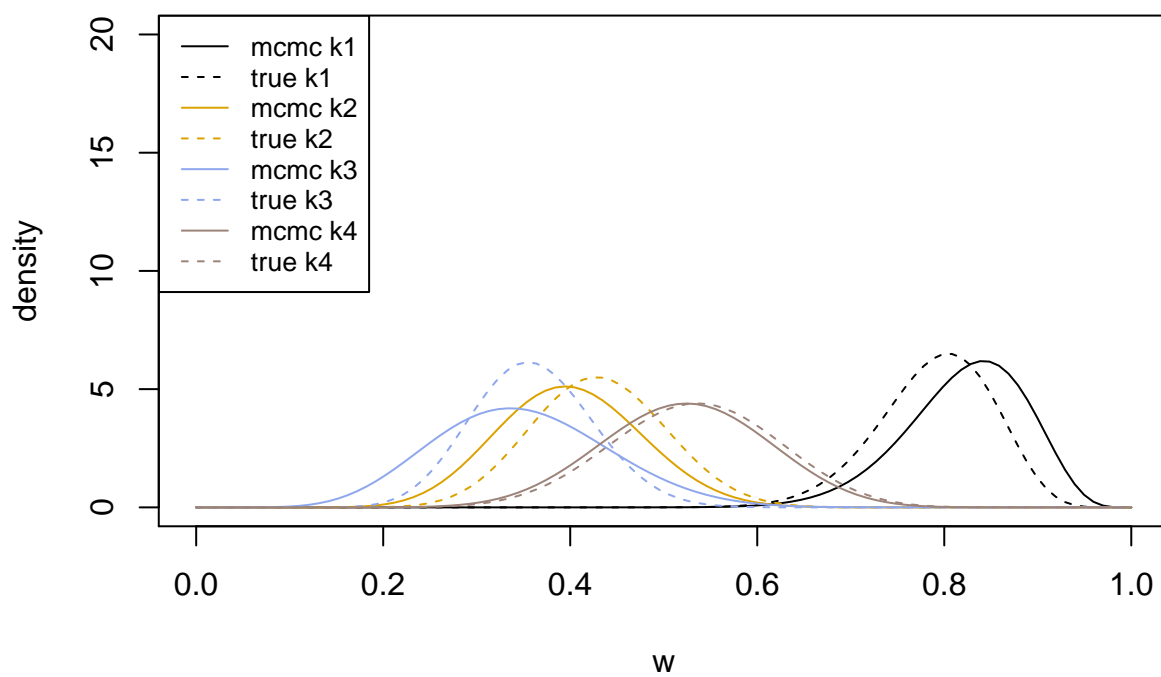
    lines(p, dbeta(p, a.ordered[k,s], b.ordered[k,s]), type = "l", col = colors[k], lty=2)
  }
}
}

```

**S1**

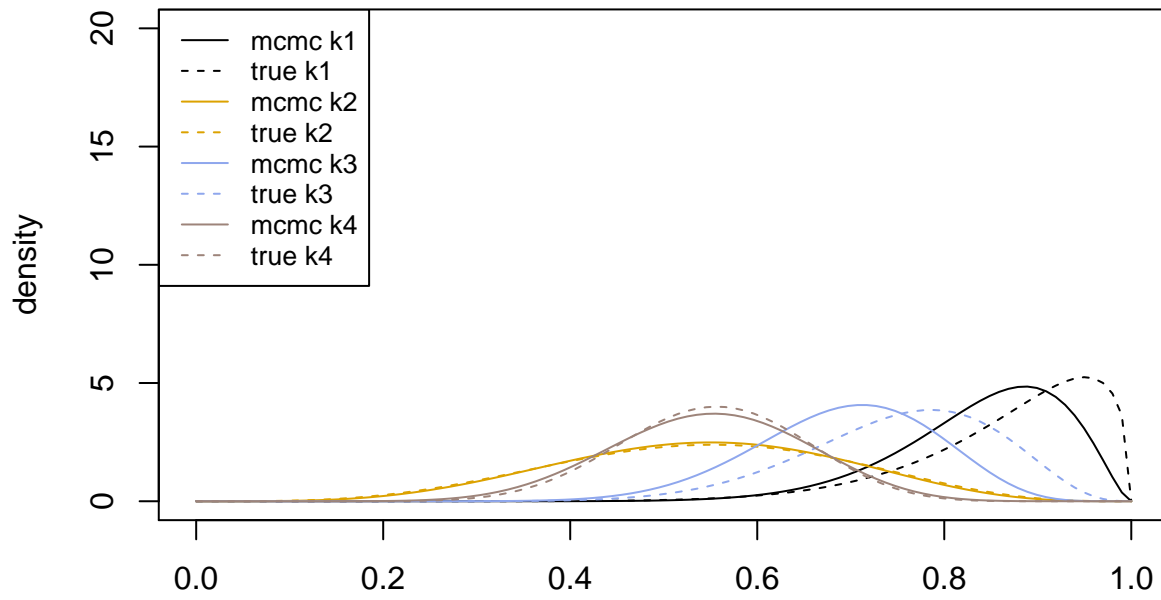


**S2**

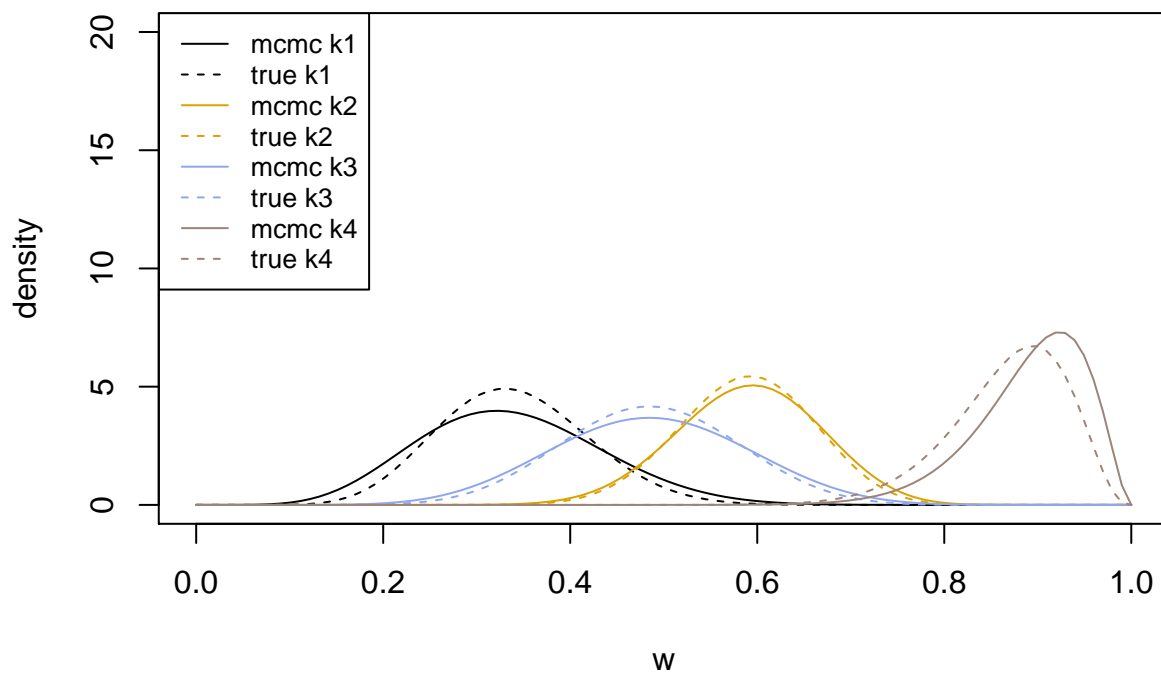




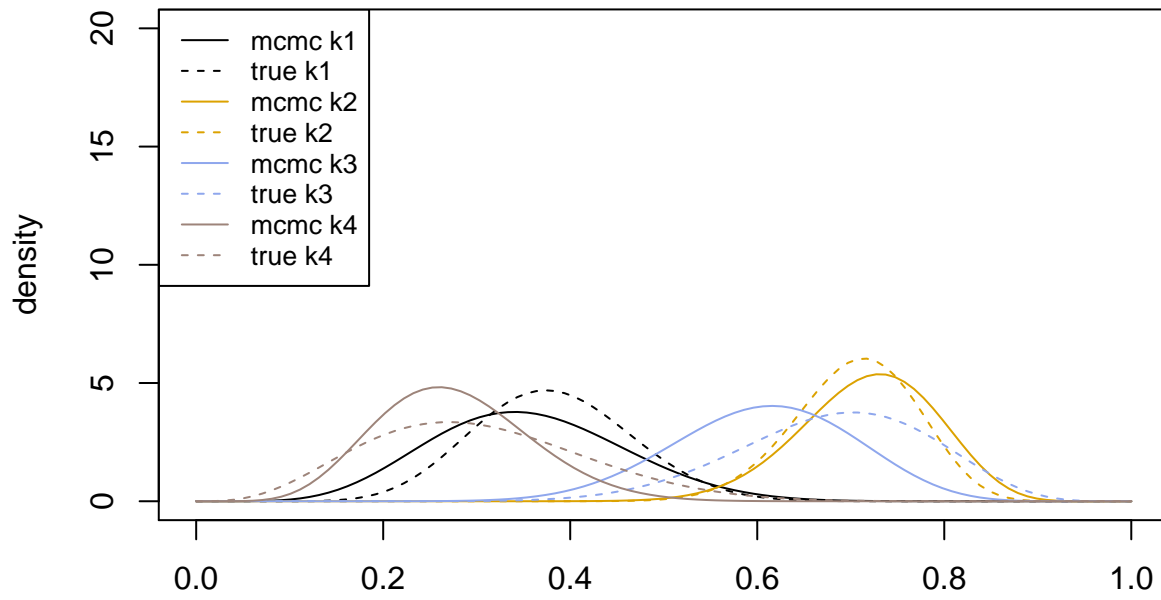
**S3**



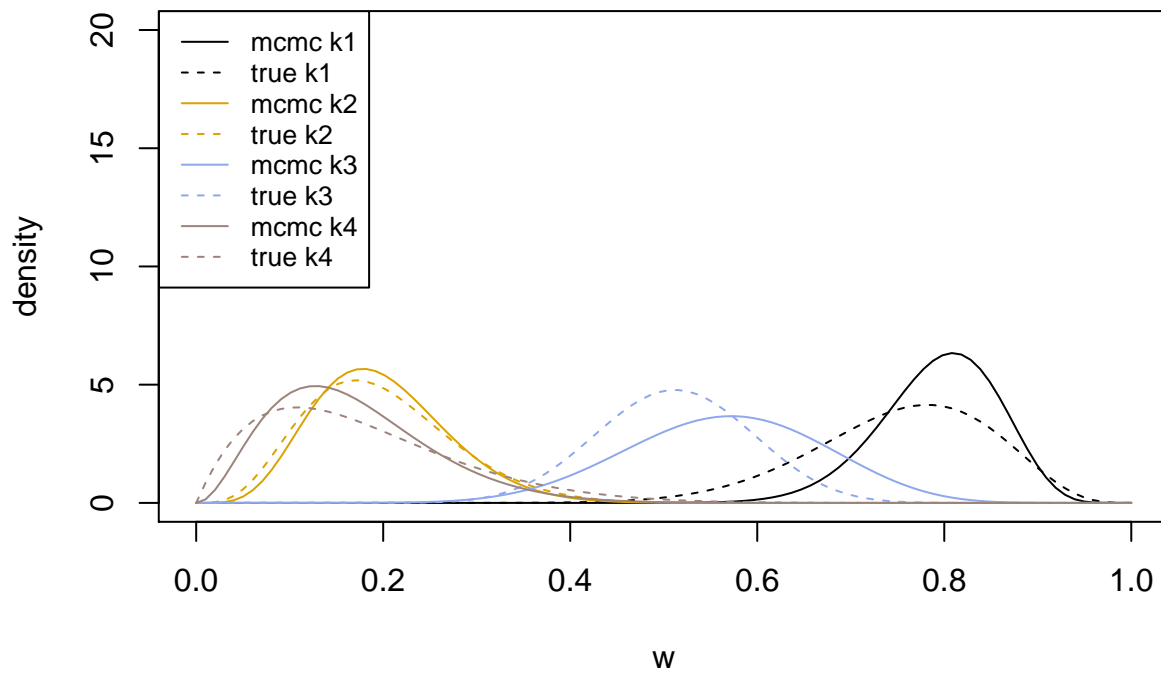
**S4**



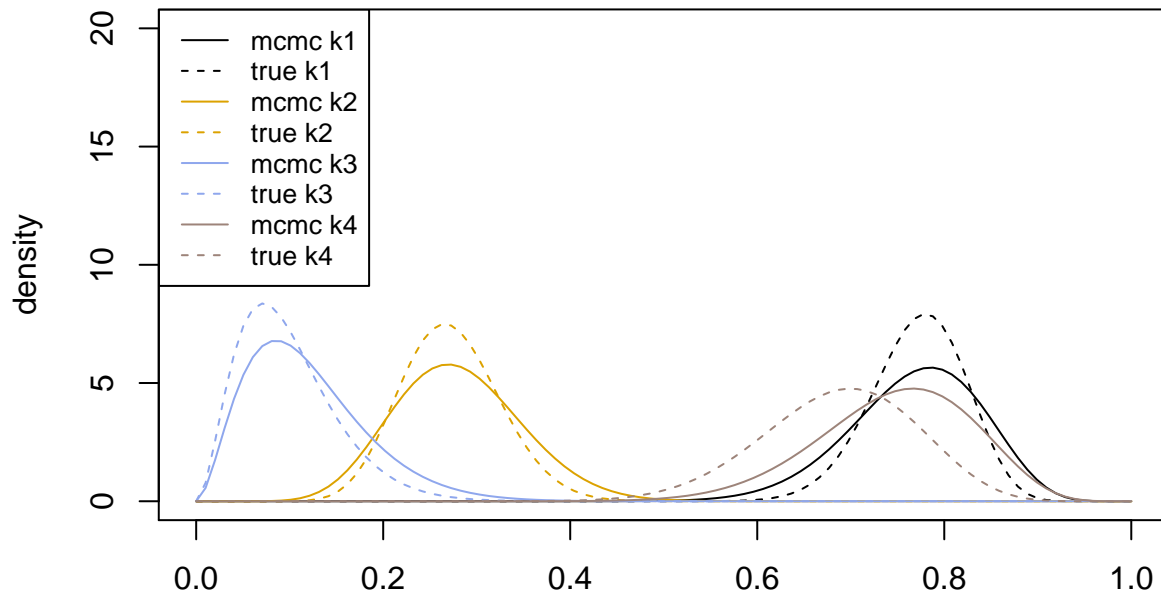
**S5**



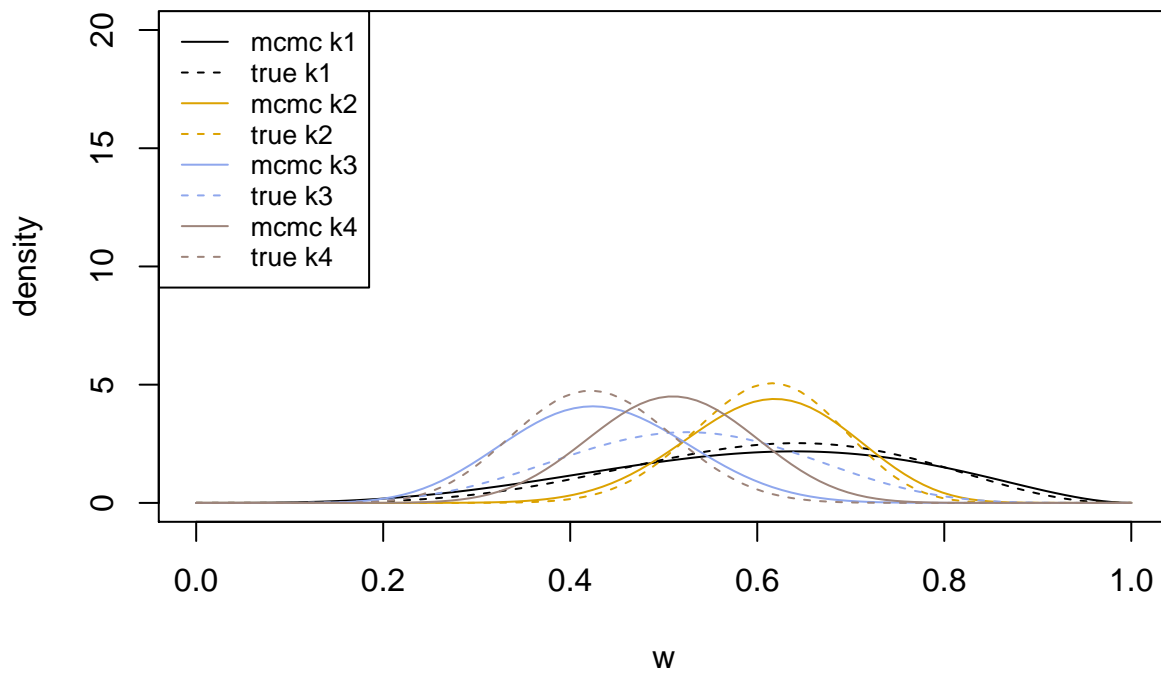
**S6**



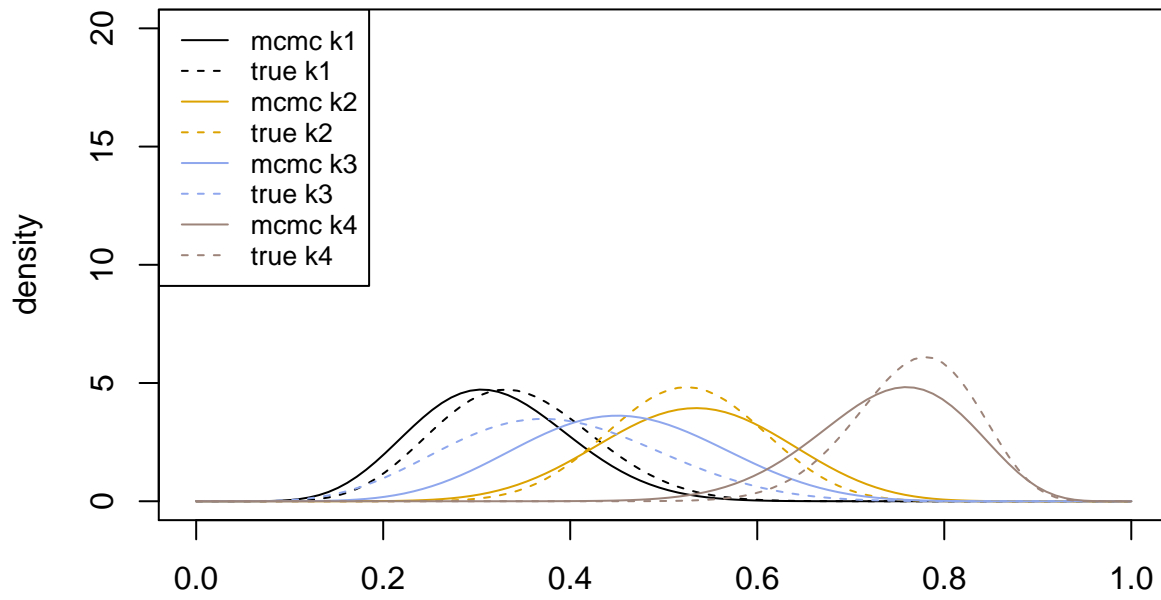
**S7**



**S8**



**S9**



**S10**

