This entire quiz concerns the committee example in Sec. 3.9.2, pp.61ff. Except for Problem 3(c), all answers are numeric. As usual, numeric answers must be given as R expressions that evaluate to numbers. Note that there are 5 problems, 1-5.

1. (10) Find \( P(\text{first pick is women, second is man}) \).

2. (15) Find \( P(D = 0) \). For full credit, use an appropriate R function.

3. Consider the following simulation code:

   ```r
   sim <- function(nreps) {
     reprecords <- matrix(nrow=nreps, ncol=5)
     for (rep in 1:nreps) {
       comm <- pickcommittee()
       reprecords[rep,1:4] <- comm
       tmp <- sum(comm)
       # find tmp=4-tmp
       reprecords[rep,5] <- 2*tmp-4
     }
     reprecords
   }
   pickcommittee <- function() {
     # choose the 4-person committee, recording
     # each time whether a man is picked
     npeopleleft <- 9
     nmenleft <- 6
     pickedsofar <- NULL
     for (i in 1:4) {
       propmen <- nmenleft / npeopleleft
       manpicked <- sample(0:1,1,prob=c(1-propmen,propmen))
       nmenleft <- nmenleft - manpicked
       npeopleleft <- npeopleleft - 1
       pickedsofar <- c(pickedsofar, manpicked)
     }
     pickedsofar
   }
   
   We then run
   ```
   ```r
   > simout <- sim(100000)
   ```
   
   We then print out some quantities, as seen below.

   (a) (15) What will be printed out from this?
   ```r
   > mean(simout[,5])
   ```

   (b) (15) What will be printed out from this?
   ```r
   > mean(simout[,3])
   ```

   (c) (20) What will be printed out from this?
   ```r
   > rownums <- which(simout[,1] == 1)
   > sum(simout[rownums,2]) / length(rownums)
   ```

   Your answer here in Part (c) must be in “\( P() \)” form, using only symbols in the book, e.g. \( P(D = 9) \).

4. (15) Find \( \text{Var}(G_4) \).

5. (10) Find \( \text{Cov}(G_1, G_4) \).
Solutions:
1. \((3/9)(6/8)\)
2. We need \(P(M = W = 2)\). It is 
   \[
   \frac{\text{choose}(6, 2) \times \text{choose}(3, 2)}{\text{choose}(9, 4)}
   \]

3.a \(ED = 4/3\)
3.b \(P(G_3 = 1) = 6/9\)
3.c \(P(G_2 = 1|G_1 = 1)\)
4. \(G_4\) is an indicator random variable, and thus its variance is \(p(1 - p)\), where \(p = P(G_4 = 1) = 2/3\).
5. We need to find

   \[
   E(G_1G_4) - E(G_1) \cdot E(G_4)
   \]  

   The latter term is \((6/9)^2\). To find \(E(G_1G_4)\), use reasoning similar to that on the top of p.63 to find that

   \[
   E(G_1G_4) = E(G_1G_2) = \frac{6}{2} \times \frac{3}{0} / \frac{9}{2}
   \]  

   (2)