

# Assignment 1: CS 215

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## Question 1

(a) The situation is equivalent to distributing  $n$  books to  $n$  people. The total number of ways of doing that is  $n!$ . There is only 1 way in which everyone gets his book back. So the probability of it happening is  $\boxed{1/n!}$

(b) There is only 1 way of distributing  $m$  books to their respective  $m$  owners. And for this way there are  $(n - m)!$  ways of distributing the left  $n - m$  books among left  $n - m$  people for a total of  $1 \times (n - m)! = (n - m)!$  ways. So the probability of it happening is  $\boxed{(n - m)!/n!}$

(c) There are  $m!$  way of distributing the  $m$  books belonging to the last  $m$  people to the first  $m$  people. And for each such way there are  $(n - m)!$  ways of distributing the left  $n - m$  books among left  $n - m$  people for a total of  $m! \times (n - m)! = m!(n - m)!$  ways. So the probability of it happening is  $\boxed{m!(n - m)!/n!}$

(d)

## Question 2

## Question 3

## Question 4

## Question 5

a.  $P(C_1|Z_1) = 1/3$

$$P(C_2|Z_1) = 1/3$$

$$P(C_3|Z_1) = 1/3$$

## Question 6

