

QUIZ 8 FOR M325K

Name: _____
UT EID: _____

You may use a calculator otherwise you may give the solutions using factorials.

(1) How many different poker hands are there than contain only a single pair ?

1. Choose denomination for the pair ( ${}^{13}C_1 = 13$ )
2. Choose suits for the pair ( ${}^4C_2 = 6$ ).
3. Choose 3 denominations for off cards. ( ${}^{12}C_3 = 220$ )
4. Choose 3 suits for off cards ( ${}^4C_1 \times {}^4C_1 \times {}^4C_1 = 64$ )

Total number of 1 pair hands  $13 \times 6 \times 220 \times 64 = 1098240$

(2) In planning a small soirée you want to get 12 assorted beverages. You consider 5 kinds of beverages; Chimay Red, Kwak, Duvel, Delirium Tremens, and Lone Star.

(a) How many ways of making up the dozen beverages are there ?

The number of 12 element multisets from a set of 5 elements is  ${}^{16}C_{12} = 1820$  In general the number of  $r$  element multisets from a set of  $n$  element is  ${}^{n+r-1}C_r$  or  ${}^{n+r-1}C_{n-1}$  (number of "dividers") (number of objects to choose)

(b) Suppose you must buy at least one of each type. How many ways are there of making up the dozen beverages ?

If there is already one of each type then it remains to freely choose 7 beverages from the 5 types.

The number of 7 element multisets from a set of 5 elements is  ${}^{12}C_7 = 330$

(c) Suppose you must buy at least 3 Lone Star beverages. How many ways are there of making up the 12 beverages ?

If there are already 3 Lone Star beverages then it remains to freely choose 9 beverages from the 5 types. The number of 9 element multisets from a set of 5 elements is  ${}^{13}C_9 = 715$ .