# M 362K Post-Class Homework 1

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January 21, 2015

## 1-7

For each of the digit positions, there are 10 possible outcomes

For the first and third alpha positions, each has $26 - 3 = 23$ possible outcomes since I,O and Q are excluded

For the second alpha position, there are 26 outcomes

Let $\#plates$ denotes the number of possible licence plates, then $\#plates = 10^3 * 23^2 * 26 = 1.375 * 10^7$

## 1-9

From the question we can know that the first digit has $10 - 2 = 8$ outcomes and the fourth digit has $10 - 1 = 9$ outcomes

Let $\#phone$ denotes the possible number of ten-digit phone numbers. Therefore,

$$\#phone = 8 * 9 * 10^{10-2} = 7.2 * 10^9$$

# 1-12

According to the question, the number of possible outcomes for the trifeeta with 8 horses is

${}_8P_1 * {}_7P_1 * {}_6P_1$

Therefore, $Pr(winning\ ticket) = \frac{1}{{}_8P_1 * {}_7P_1 * {}_6P_1} = \frac{1}{8*7*6} = \frac{1}{336}$

# 1-17

According to the question, there are 11 possible floors and 7 people. The total number of possible outcomes is $11^7$

If no two will get of at the same floor, this is equivalent to the permutation of 11 floors chosen 7, which is ${}_{11}P_7$

$\therefore Pr(no\ two\ get\ of\ at\ the\ same\ floor) = \frac{{}_{11}P_7}{11^7} = \frac{11!}{(11-7)!11^7} \approx 0.085$

# 1-24

## (a)

There are 13 toppings, 2 sizes and 2 types of crust

Let $\#2 - top - pizza$ be the number of different two-topping pizzas

$\therefore \#2 - top - pizza = {}_{13}C_2 * {}_2C_1 * {}_2C_1 = 312$

## (b)

There are 6 meat toppings, 7 vegetable toppings, 2 sizes and 2 types of crust

Let $\#2 - top - mv - pizza$ be the number of different two-topping pizzas with exactly one meat and exactly one vegetable topping

$\therefore \#2 - top - mv - pizza = {}_6C_1 * {}_7C_1 * {}_2C_1 * {}_2C_1 = 168$

### (c)

There are 7 vegetable toppings, 2 sizes and 2 types of crust

Let $\#4 - top - v - pizza$ be the number of different four-topping vegetarian pizzas

$\therefore \#4 - top - v - pizza = {}_7C_4 * {}_2C_1 * {}_2C_1 = 140$

## 1-32

The number of possible words with 4 letters is indeed the permutation of the 4 letters. However, since the order of letter O does not matter, the number of possible words is therefore $\frac{4!}{2} = 12$

## 1-36

### (a)

This is equivalent to dividing 25 girls into 3 groups of 5,5,15 girls respectively

Let $\#partition$ denotes the number of such partition

$\therefore \#partition = \begin{pmatrix} & 25 & \\ 5 & 5 & 15 \end{pmatrix} = \frac{25!}{5!*5!*15!} = 823727520$

## (b)

This question is also equivalent to 25 girls into 3 groups of 5,5,15 girls respectively (2 teams of 5 people and 1 group of 15 not playing)

Let $\#partition$ denotes the number of such partition

$$\therefore \#partition = \begin{pmatrix} & 25 & \\ 5 & 5 & 15 \end{pmatrix} = \frac{25!}{5!*5!*15!} = 823727520$$