

Lab Two

Computational Probability and Statistics

CIS 2033, Section 002

Due: 11:59 AM, Tuesday, Feb. 10, 2015

Submissions Please copy all your code in one script named as Lab2.m. Submit both of your Lab2.m script and the plotted figure.

Question 1 Plot the figure (Fig. 3.1, p. 29): the probability of $P(B_n)$ of no coincident birthdays for $n = 1, 2, \dots, 100$. You have to

1. Download `CompProb.m`¹. This function has one input parameter n . It outputs the probability of $P(B_n)$, denoting as the probability of no coincident birthdays for the n people.
2. Open Matlab, direct the Current Folder window to where you stored the file.
3. Create an array `ns = 1 : 100` in Matlab.
4. For each value n in ns call `CompProb(n)`, which calculates the probability for $P(B_n)$, store all the probabilities in a new array, say `P_Bns`. (Matlab do not support variable names like `P(Bns)`)
5. plot the figure of `P_Bns` vs `ns`, where the x-axis denotes n and the y-axis denotes the computed probability $P(B_n)$, for $n = 1, 2, \dots, 100$.

Question 2 If we want to choose k different objects out of an unordered list of n objects, how many combinations are there for the choice? We denote the total number of combinations as $C_{n,k}$ or $\binom{n}{k}$, simply means choose k from n . The formula to calculate

$\binom{n}{k} = \frac{n!}{k!(n-k)!}$. For Question 2, please do the following:

1. Download `nchoosek_byTA.m`². This function has two input n, k . It outputs the number of combinations, calculated by the given formula.

¹<http://nymph332088.github.io/CIS2033/2033/Labs/02/Questions/CompProb.m>

²http://nymph332088.github.io/CIS2033/2033/Labs/02/Questions/nchoosek_byTA.m

2. Open Matlab, direct the Current Folder window to where you stored the file.
3. Create variables **n = 20** and **ks = 1 : 20** in Matlab.
4. For each value k in ks , call $nchoosek_byTA(n, k)$, store all the outputs in an array **combs_byTA**.
5. For each value k in ks , call the built-in Matlab function $nchoosek(n, k)$, store all the outputs in another array **combs_Matlab**.
6. Check whether **combs_byTA** and **combs_Matlab** are the same.
7. Plot **combs_byTA** vs **ks** and plot **combs_Matlab** vs **ks** in two pictures, where in both pictures x-axis denotes k and the y-axis denotes $\binom{20}{k}$, for $k = 1, 2, \dots, 20$.