1. How many steps did all residents of San Francisco take over the last decade? Give an answer and explain your reasoning.
2. What’s the probability that 2 people randomly sampled from the U.S. population with replacement have the same first name, last name and birthday? What’s the probability that they are the same person.

I am not 100% on this, but here is my best guess. I see this as just an expansion of the classic questions of the probability that someone in a group of n people has the same birthday has me. As such, we need the total possible combination of birthdays, last names and first names and need estimates for those names. I found some estimates for number of unique first and last names. 150,000 last names and about 5000 first names.

Also, instead of asking about two random people, let’s make it a bit more intuitive and restate the question as, “what is the probability that someone else in the US has my information?” It still satisfies the two random picks, just that I am the first random pick.

Next, to make the analytical solution easier, we should find the probability that nobody else shares the same information as me, and then subtract that value from 1. The complement of nobody having my information is one person having my information.

We need two very large numbers as numerator and denominator, basically all the different combinations possible for birthdays, and the first and last names for the US population. That is: 365 birthdays \* 150,000 last names \* 5000 first names all powered to our n, which in this case is 315 million. That is our denominator. In the numerator, it will simply be the total number we found above minus 1 (for me) then to the power of 315 million. Then of course, subtract that entire fraction from 1 to get our original probability of interest.

P(Someone else shares my birthdate (month and day), first and last name) =



And for the second part of the question, I believe that with replacement, the chance of drawing the same actual person again is simply 1 in 315 million.