Question 1.

The random variable X and Y have the following joint probability density

$$f_{XY}(x,y) = \begin{cases} e^{-x-y} & 0 < x < \infty, 0 < y < \infty \\ 0 & elsewhere \end{cases}$$

What is $P(X < Y)$?

Question 2.

Counting the pairs with k different from an integer list.
eg: list = [1, 3,5] and k = 2
expected: we will have 2 pairs: {(1,3), (3,5)}
Note: we also consider the negative numbers. You may only use Python

Question 3 .

Return the list of indices. The indices is a sublist points to the same person. The same persons means they have the same name or email or phone. You may only use Python.
eg:

```
data = [
   ("username1","phone_number1", "email1"),
   ("usernameX","phone_number1", "emailX"),
   ("usernameZ","phone_numberZ", "email1Z"),
   ("usernameY","phone_numberY","emailX"),
 ]
```

expected: [[0,1,3][2]]

Question 4.

It's 2008 all over again and Redis have not been invented yet. Your task, should you choose to accept is to design a caching library from scratch for the entire world to use (as redis would have become).

What is expected of you is to come up with a first deliverable after about 2 hours of work. You are free to do any necessary research on the internet as with real task.

We do not expect you to complete all the features but at the bare minimum, it should have basic caching functionalities.

Write the code with the intention of announcing your pet project on twitter, Hackernews or reddit to encourage contributors (as redis author did way back in 2009 https://redislabs.com/blog/redis-turns-10/).

Deliverables:

- Git bundle of your solution

- Documentation of design considerations & trade-offs taken

Constraints:

You may only use Python