1) Consider that you have a 1TB file with numbers from 0.0 to 1.0, the numbers are randomly generated and the file have no specific order inside:

1.a) Explain how to get the biggest interval between any 2 numbers in the file, probably they are not consecutive numbers.

1.b) Explain how to get the minor interval between any 2 numbers in the file, probably they are not consecutive numbers.

1.c) Explain how to get the median (numeric value separating the higher half from the lower half)

2) Consider that on Monday I give you a text file with a fix number of columns, and I ask you to get me a program that receives 4 letters words on the STDIN an answers if the string is present vertically on the file.

2.a) Explain some different ways to implement it.

2.b) Which is the time and space complexity from the precedent solution?

3) Consider that you are doing a system to monitor the temperature of a nuclear reactor. You need to have a display with the maximum temperature on the last 60 minutes. You are getting 100 temperature readings an second, without the noise. Implement a class that has 3 methods:

3.a) new: creates an object;

3.b) add_temp: adds the temperature to the object

3.c) get_max_temp: gets the maximum temperature on the last 60 minutes.

4) Given that you have one string of length N and M small strings of length L. How do you efficiently count the occurrences of each small string in the larger one?

5) Given a function which produces a random integer in the range 1 to 5, write a function which produces a random integer in the range 1 to 7.

6) How many lines can be drawn in a 2D plane such that they are equidistant from 3 non-collinear points?

Geometric:

1) How many lines can be drawn in a 2D plane such that they are equidistant from 3 non-collinear points?

2) How many degrees are there in the angle between the hour and minute hands of a clock when the time is a quarter past three?

Random:
1) Given a function which produces a random integer in the range 1 to 5, write a function which produces a random integer in the range 1 to 7.

2) There is a very big linked list and you do not know the length of it.
   2a) Describe one algorithm that will return a random number from the list.
   2b) Describe one algorithm that will return 10 random number from the list.

Strings (data structures):
1) Given that you have one string of length N and M small strings of length L. How do you efficiently count the occurrences of each small string in the larger one?

2) What kind of data structure would you use to index anagrams of words? e.g. if there exists the word "dog" in the database, the query for "god" should list that word.