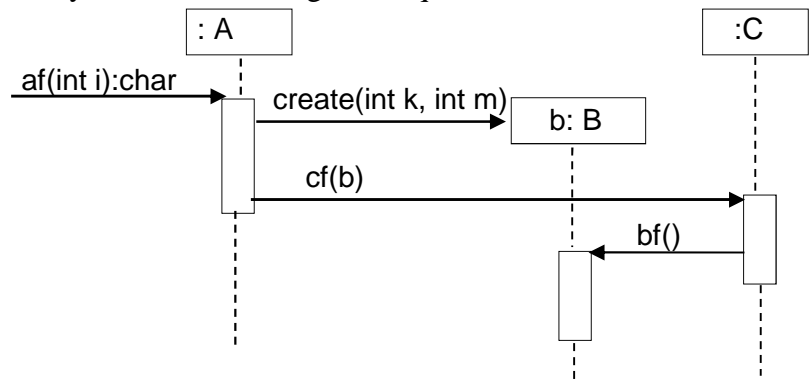## QUESTION 1:

a) Draw the UML class diagram of the system that has the given sequential interaction diagram on the right.

b) What kind of visibilities exists among these classes?

c) Re-design the classes A,B and C by taking the "low coupling" pattern into account and draw the UML sequential diagram again.

QUESTION 2:

A class X, to fulfill its responsibility r(), gets service from (sends message m() to) class A. There is a possibility, that in the future class A can be replaced by class B, which has a different interface. Class A will be completely removed from the system and class B will be used instead of it. It is not possible to use more than one class at the same time to get the service.

a. Design this part of the system according to design principles and patterns. Draw the class diagram and mention the principles and patterns used in this solution.
b. Is the polymorphism necessary for this solution? Explain shortly.
c. Assume that Class A will not be removed from the system and class X will get the same service sometimes from class A and sometimes from B. In the future a new class C can also be added to the system. Design this part of the system, draw the class diagram and mention the principles and patterns used in this solution.

QUESTION 3:

The advice proposed by the creator pattern of GRASP is that "Assign class B the responsibility to create an instance of class A if B has the initializing data that will be passed to A when it is created".

a) Show an exemplary case where this advice of the creator pattern contradicts to other principles and patterns.

b) Show how the system should be designed in such a cease by drawing a UML communication diagram.