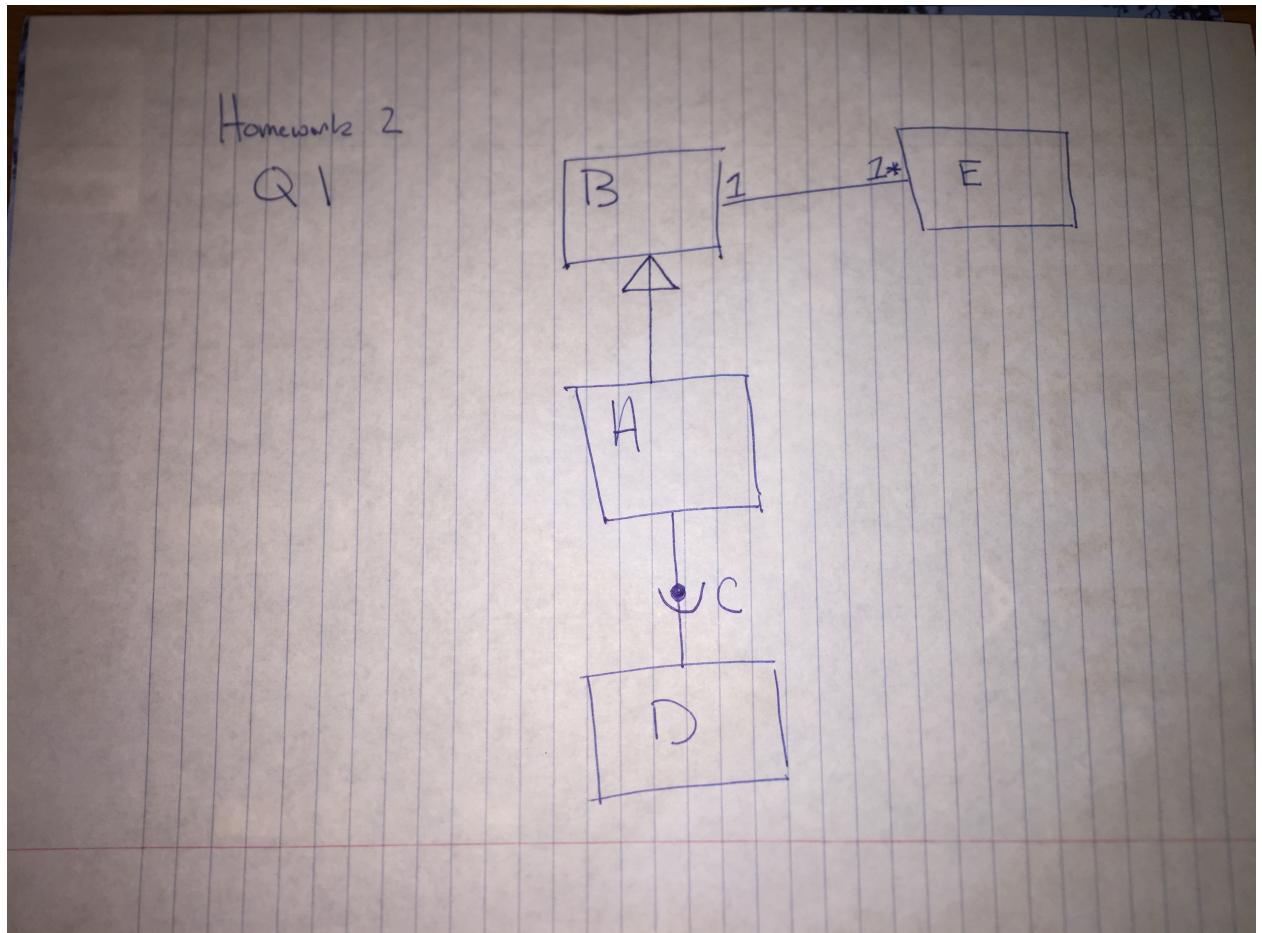


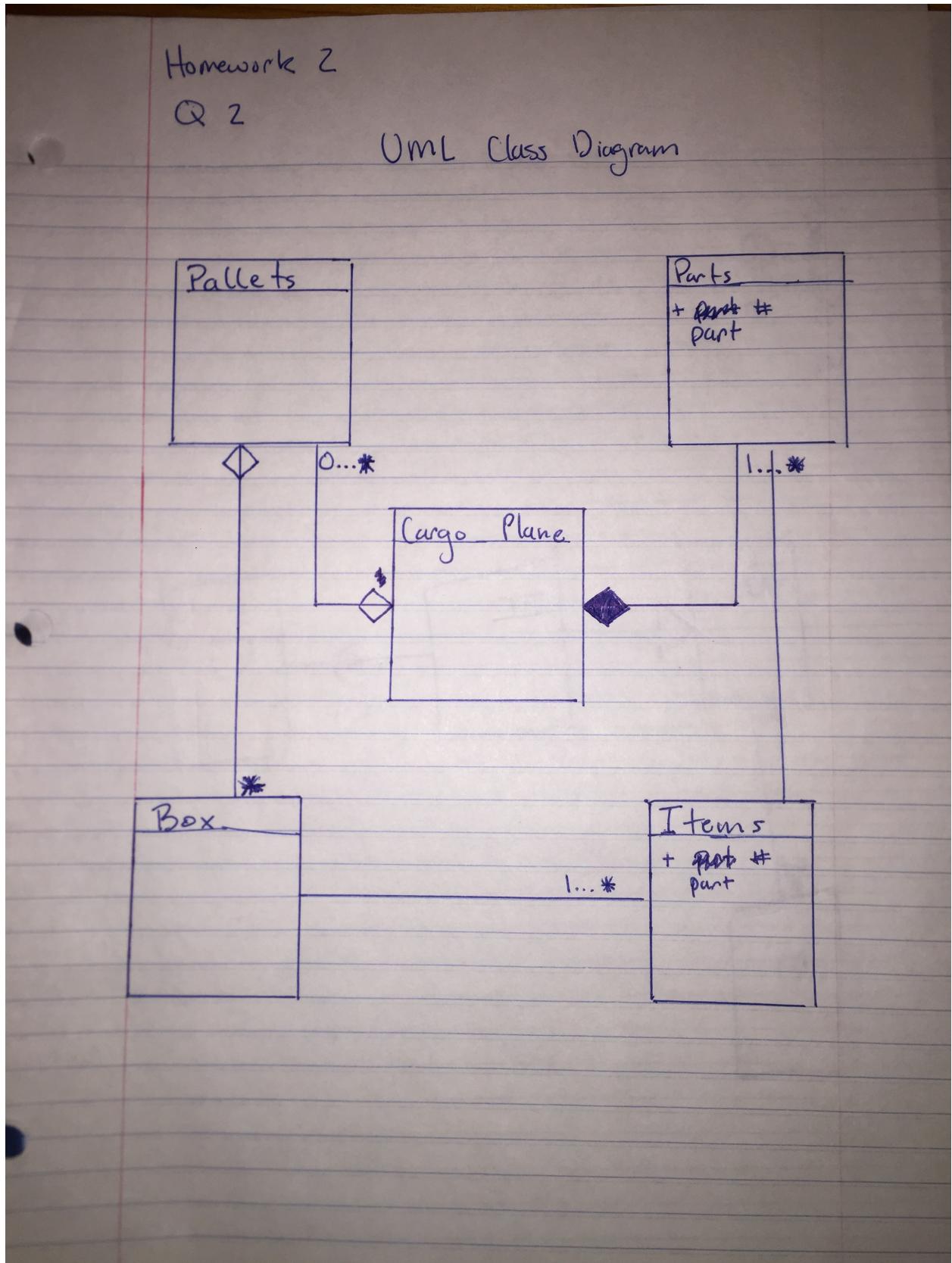
Problem 1. Draw a UML class diagram that models the following statements: A is a subclass of B. A implements interface C which is used by D to access A. B is associated with one or more E's.



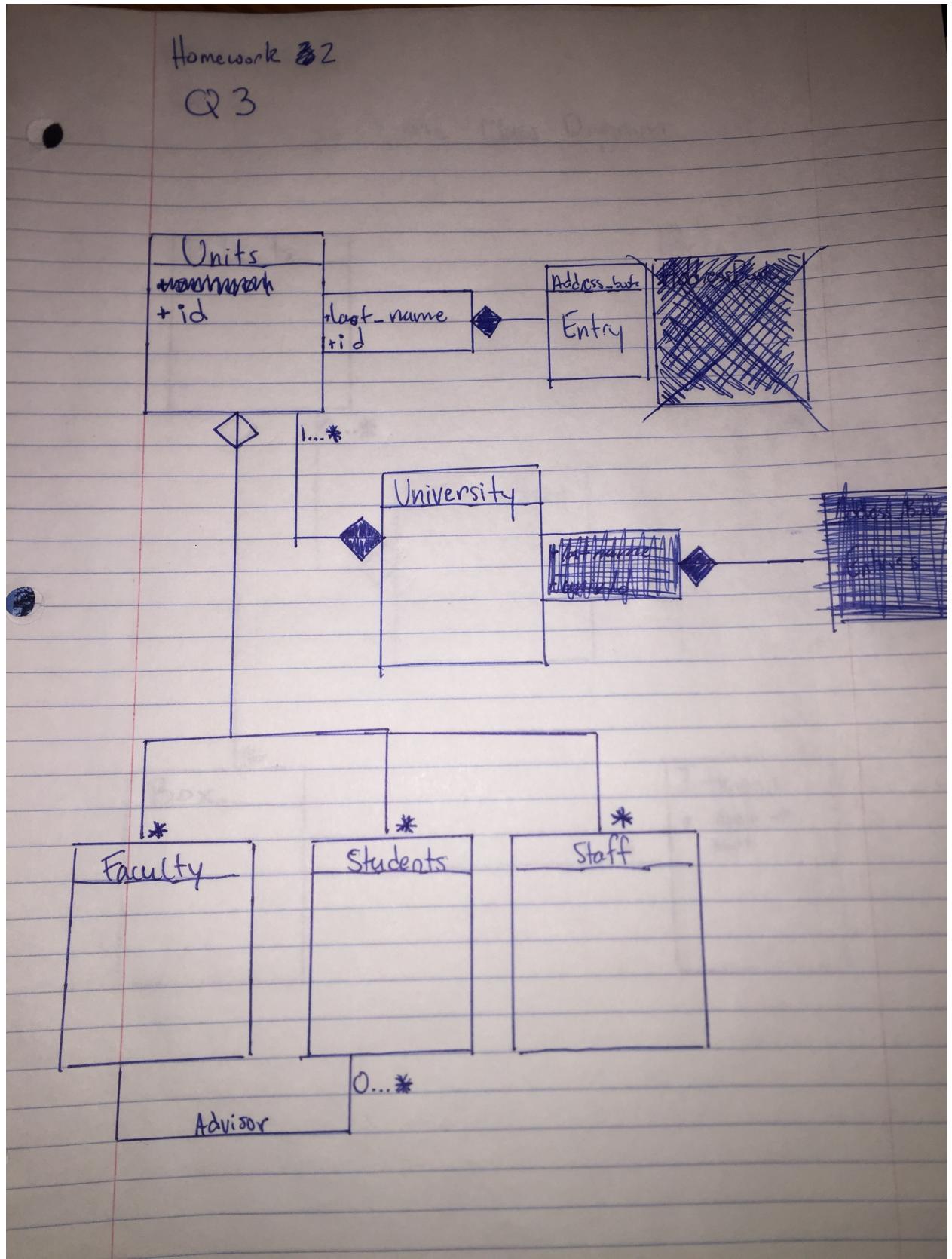
Solution:

Problem 2. Draw a UML class diagram that models the following statements: Cargo Plane aggregates zero or more Pallets. Each Pallet aggregates zero or more Boxes; CargoPlane is composed of one or more Parts. Inside each Box are one or more Items that are accessed by part number.

Solution:



Problem 3. Draw a UML class diagram that models the following statements: A University is composed of one or more Units, such as Colleges and Schools. Each Unit contains faculty, students and staff. A unit maintains an address book filled with entries, one for each type of person contained in that unit. An entry can be located in the address book by supplying their last name or their university id. Faculty members can be the advisor of zero or more students.

Solution:

Problem 4. A is a subclass of B. A implements interface C which is used by D to access A. B is associated with one or more E's. Can D access an instance of B via C's interface? Explain.

Solution:

No, D can not access an instance of B via C's interface. Using C reference we can only access those methods which were declared in interface C. Using an interface reference, we can only access the classes and interface methods which are declared public. We cannot access methods of other classes or interfaces.

Problem 5. Imagine we have a system that has a class called Shape and sub classes Square, Circle, and Triangle each developed by a different software engineer. The system uses these classes to create randomly generated visualizations that balance various constraints concerning the area and perimeter of each individual shape along with the total area and total perimeter of all shapes on the screen. (An example of such a constraint might be that the total area of all shapes must always be twice as large as the total perimeters.) One engineer, feeling capricious, decides to implement the getArea() method of the Square subclass by having it return the perimeter of the Square instead. What design heuristic or constraint presented in lectures about classes has this engineer violated and what repercussions will it have in the overall system?

Solution:

The engineer violated the square subclasses where only the area is returned and perimeter is not returned. Since the engineer return the perimeter they have violated the consistency and standards of the system. One should not have to wonder what the square subclass is supposed to return. It would not be possible to display the correct information because this class return the perimeter and not the area.