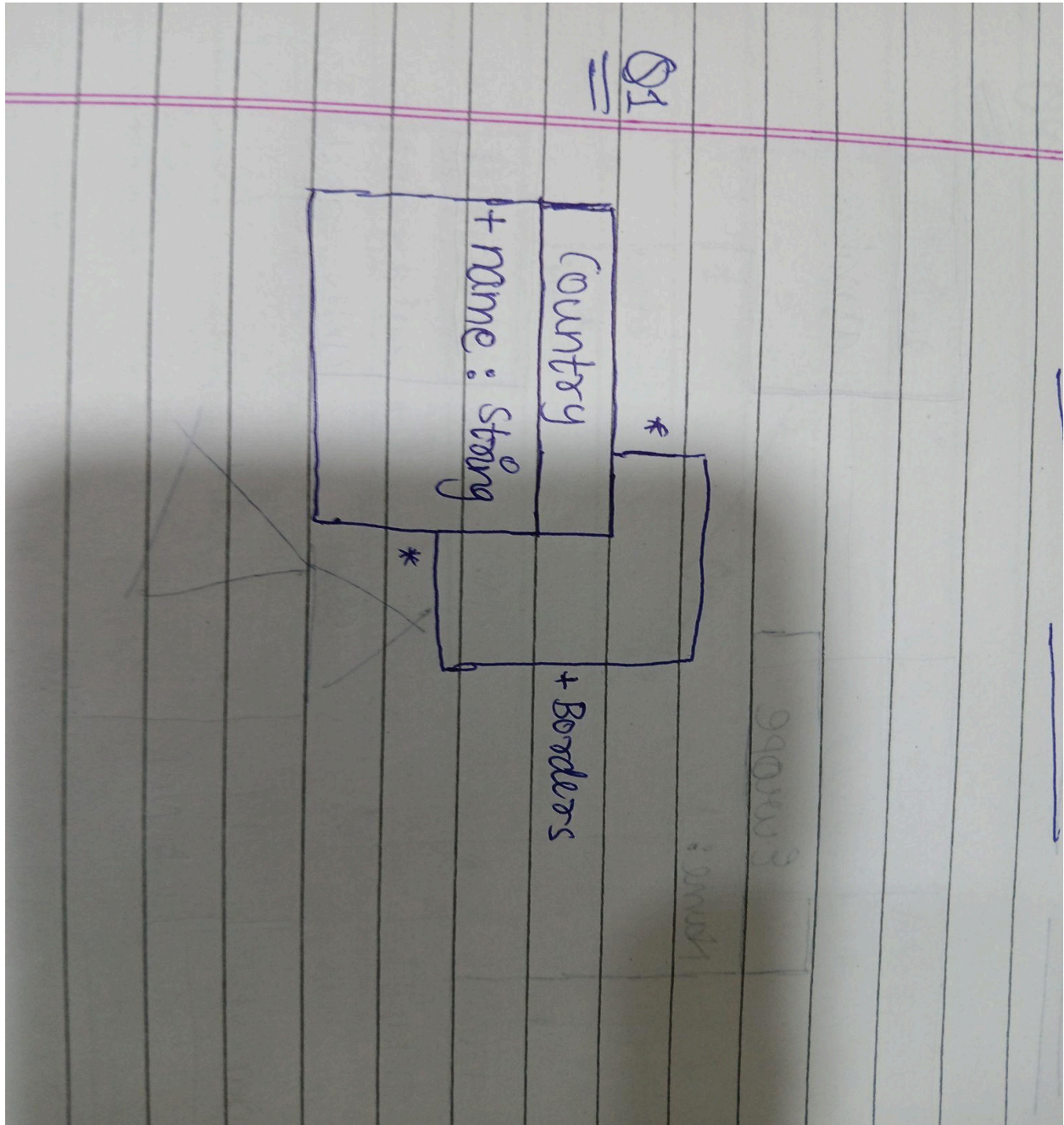**Q1.** Prepare a class diagram for the following object diagram that shows a portion of Europe.

Q2. **Prepare a class diagram for the object diagram given in Figure -2. Explain your multiplicity decisions. What is the smallest number of points required to construct a polygon? Does it make a difference whether or not points may be shared between polygons? Your answer should address the fact that points are ordered.**
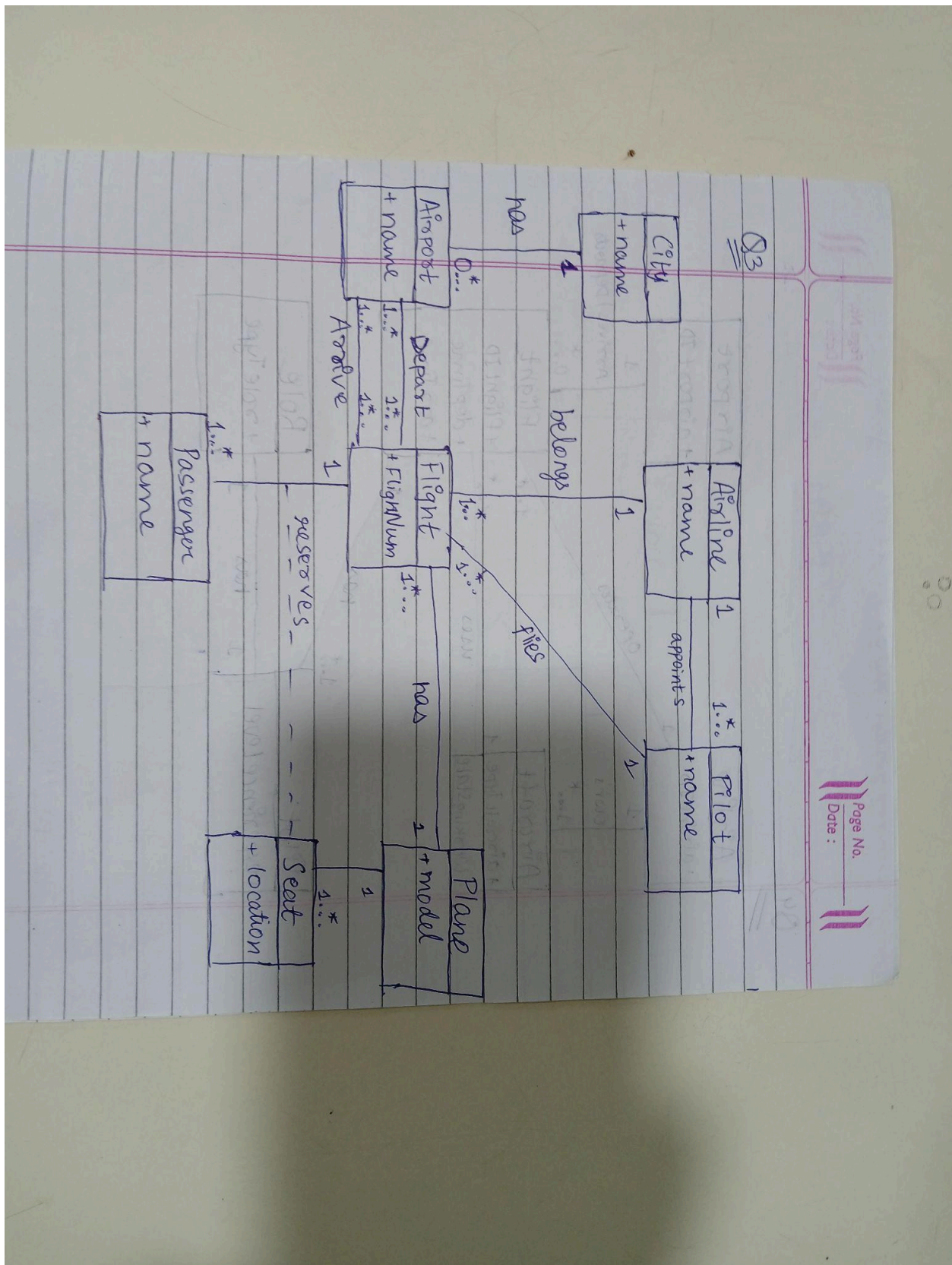
Q.2

Polygon

+ Has

Point
+ x coord
+ y coord

1   3...

*

- The multiplicity is justified since to construct a polygon, we would need at least 3 points.

- Smallest number of points required to construct a polygon are 3 (triangle).

' No, it won't make a difference if a point is shared between polygon, since we can include that point in any polygon.

- **For polygon , smallest number of point required is 3 for triangle, which justify the multiplicity**
- **It doesn't make any difference whether points are common or not.**

Q3. Figure 3 is a partially completed class diagram of an air transportation system. Add multiplicities in the diagram. Also add association names to unlevelled associations.

Q3

City
+ name

Airline   1   1...*   Pilot
+ name   + name
                      appoints

has
        belongs

Airport
+ name   Depart   Flight   has   Plane
                          + FlightNum   + model

        Arrive

                          reserves

                Passenger   Seat
                + name   + location

flies

Q4. We want to model a system for management of flights and pilots. An airline operates flights. Each airline has an ID. Each flight has an ID, a departure airport and an arrival airport: an airport as a unique identifier. Each flight has a pilot and a co-pilot, and it uses an aircraft of a certain type; a flight also has a departure time and an arrival time. An airline owns a set of aircrafts of different types. An aircraft can be in a working state or it can be under repair. In a particular moment an aircraft can be landed or airborne. A company has a set of pilots: each pilot has an experience level: 1 is minimum, 3 is maximum. A type of airplane may need a particular number of pilots, with a different role (e.g.: captain, co-pilot, navigator): there must be at least one captain and one co-pilot, and a captain must have a level 3.

Q4

Airline
+airlineID

1
Owns
1..*

Aircraft
+aircraftType
+WorkingState

1

uses

Airport
+airportID

1
Operates

1
Arrives | Departs
0..*

Flight
+flightID
+depTime
+arrTime

1..*

Pilot
+experienceLevel

1..*
has
1

1
has
1

Role
+roleType