

ER Diagrams: Solutions

1.

$ person $	$ member $	$ club $	Is it possible?
5	0	8	YES <input type="checkbox"/> No
5	7	8	YES <input type="checkbox"/> No
5	0	5	YES <input type="checkbox"/> No
5	10	5	YES <input type="checkbox"/> No
11	3	4	YES <input type="checkbox"/> No
11	9	4	<input checked="" type="checkbox"/> YES No

The min constraint of 1 for club's participation in member means that every club must participate in at least one member relationship. Hence, $|club| \leq |member|$. This makes the first three and fifth false.

The max constraint of 1 for person's participation in member means that a person can participate in at most one member relationship. Hence, $|person| \geq |member|$. This makes second and fourth false.

The last is possible. Two people have no member relationships. The nine member relationships each have a unique person and must use all four clubs but some can use the same club. An example (just one of many):

Person: P1, P2, ..., P11

Member (P1, C1), (P2, C2) (P3, C3), (P4, C4), (P5, C4), (P6, C4), (P7, C4), (P8, C4), (P9, C4)

Club: C1, C2, C3, C4

2. Below is an Entity-Relationship diagram about car dealerships. It may or may not represent the domain well. Answer the questions below.

- (a) A car sale cannot involve more than one salesperson.

☒ True ☐ False

Sale is a ternary relationship set. Each relationship (each sale) has exactly three things: one salesperson and one customer and one car. None of these can be null and of course a single sale cannot have multiple salespeople, or multiple cars, or multiple customers.

- (b) There can be two cars with the same VIN as long as the model and year are different.

☐ True ☒ False

VIN is a key indicated by a black (solid) circle. Hence, no two cars can have the same VIN.

- (c) A salesperson can work at any number of dealerships.

☐ True ☒ False

A salesperson must work at exactly one dealership – indicated by (1,1) cardinality constraint.

- (d) There can't be more salespeople than dealerships.

☐ True ☒ False

A dealership may have many salespeople so there can be more salespeople than dealerships (e.g., a single dealership and 100 salespeople who all work at that one dealership).

- (e) There can be multiple sales on the same date.

☒ True ☐ False

Date is not a key (and indeed relationship sets cannot have key attributes).

- (f) Two salespeople can have the same sID as long as they work at different dealerships.

☐ True ☒ False

sID is a key so no. If we wanted to change the model to make this statement true, we would make salesperson a weak entity set that depends on the works at relationship set.

- (g) This model contains a weak entity set.

☐ True ☒ False

A weak entity set is indicated by connecting the key to the edge of a relationship set. There are none in this diagram.

- (h) The *works at* relationship is a one-to-many relationship.

☒ True ☐ False

The max cardinalities are 1 (for salesperson) and N (for dealership) and this defines a one-to-many relationship.