1. Define each of the following terms.

a. Entity type refers to the category of entities that share common attributes and characteristics.

b. Entity set is a collection of entities of the same type.

c. Intension of an entity refers to the properties and characteristics that define the entity type.

d. Extension of an entity refers to the actual instances or occurrences of an entity type.

e. Attribute is a characteristic or property of an entity type that describes it and is stored as a column in a table.

f. Domain of an attribute refers to the set of allowable values for a particular attribute.

g. Null value is a value that represents a missing, unknown, or irrelevant attribute value for an entity instance.

h. Super key is an attribute or set of attributes that uniquely identifies an entity.

i. Candidate key is a minimal super key that uniquely identifies an entity and is selected by the designer.

j. Primary key is a candidate key that is chosen as the main identifier for an entity and is indicated in the ER model by underlining the attribute.

k. Alternate key is a candidate key that is not chosen as the primary key.

l. Relationship type refers to the association or interaction between entities.

m. Relationship set is a collection of relationships of the same type.

n. Binary relationship is a relationship between two entity sets, represented by a line connecting them.

o. Ternary relationship is a relationship between three entity sets, represented by a diamond shape.

p. n-ary relationship is a relationship between more than three entity sets.

q. Cardinality of a relationship refers to the number of instances of one entity that can be associated with another entity through the relationship.

r. Weak entity is an entity that does not have a primary key of its own and depends on another entity for identification.

2. When is the concept of a weak entity used in data modeling? Define the terms owner entity type, weak entity type, identifying relationship type, and partial key.

Weak entities are used in data modeling when an entity does not have a unique identifier of its own. Instead, it depends on the existence of another entity, called the owner entity, for its identity.

The owner entity type is the entity that the weak entity type is associated with.

A weak entity type is represented by a double rectangle in an ER diagram. It is an entity that does not have its own existence and relies on a strong entity for its existence.

An identifying relationship type is used to connect the owner entity type to the weak entity type. This relationship type indicates that the primary key of the owner entity type is used as a partial key for the weak entity type.

A partial key is a key attribute of a weak entity type that, in combination with the primary key of the owner entity type, forms a unique identifier for the weak entity type.

3. A private book collector is designing a database to keep track of her purchases and book holdings. Consider the entity set Book with attributes title, author, publisher, pubDate, numberPages, condition, cost, and datePurchased.

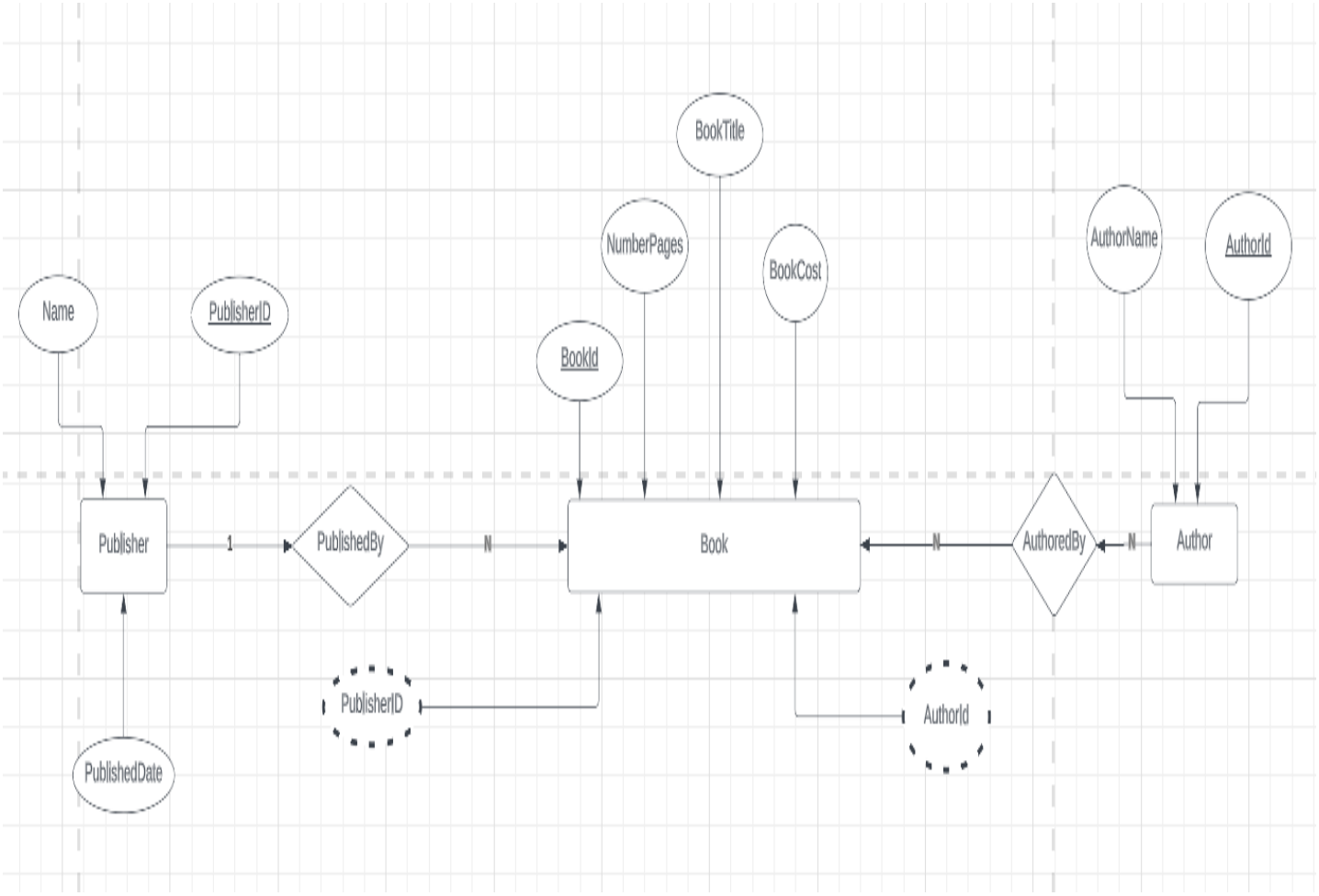
a. Show how the entity set and its attributes would be represented on an E-R diagram.

b. Describe the domain of the cost attribute, making assumptions as needed.

c. Identify a superkey for the Book entity set.

d. Identify all candidate keys for the entity set.

e. Identify a primary key for the entity set and underline it on the E-R diagram.



4. a. Assume that in the same scenario as in above exercise, there is an entity set called Purchase with attributes purchase Date, total Amount, and any others you wish to add to describe book purchases. A purchase may include several books. Show how this entity set and its relationship to Book would be represented on the E-R diagram.
b. Stating any necessary assumptions, make a decision about the cardinality and participation constraints of the relationship, and add appropriate symbols to the E-R diagram.
c. Assume there is another entity called Seller to be added to the diagram. The book collector makes purchases from many sellers, but each purchase is made from one seller. Making up attributes as needed, add this entity and appropriate relationship(s) to the diagram.