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## UML Quiz

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Quiz due May 13, 2022 08:53 IST

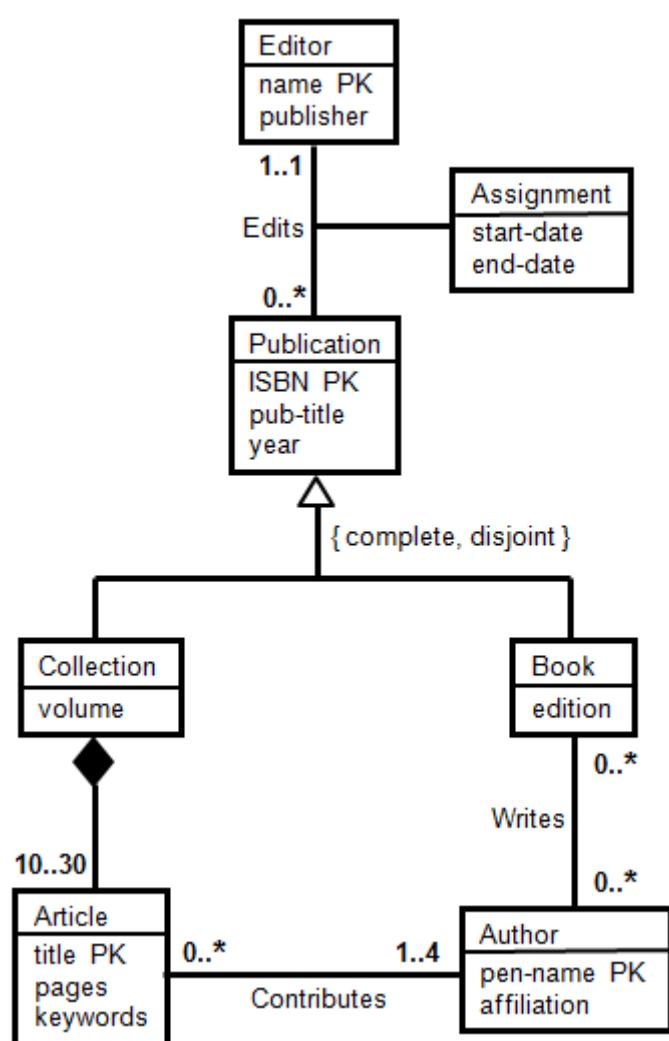
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## Q1

1/1 point (graded)

[Q1]



Consider translating this UML diagram to relations. Which of the following relations would *not* be generated by any of the recommended translation schemes discussed in the video?

☐ Book(ISBN, edition)

☐ Publication(ISBN, pub-title, year)

☒ Edits(name, publisher, ISBN, pub-title, year, start-date, end-date)

☐ Publication(ISBN, pub-title, year, name, start-date, end-

date)



### Answer-Selection Feedback

An Edits relation would be generated from the Edits association; it should include the PKs of the two classes in the association, and the attributes of the Assignment association class.

### Problem Explanation

The question relies on the given translations from UML to relations for classes, associations, association classes, and subclassing. In addition to the basic default translations, we can "fold" the Edits association into the relation for the Publication class based on the 1..1 multiplicity, and there are different choices for how to translate the subclassing relationship.

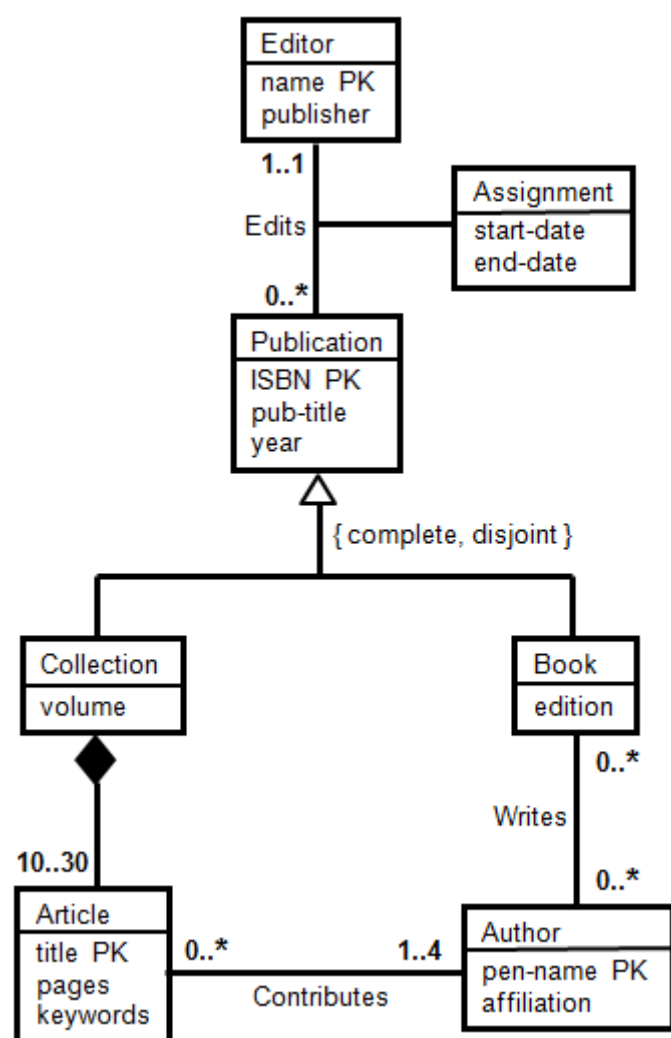
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**i** Answers are displayed within the problem

## Q2

1/1 point (graded)

[Q2]



Based on this UML diagram, which of the following statements about Authors is correct?

☐ Every author has contributed at least one article and at least one book.

☒ A book may have no authors.

☐ Every book has up to one author.

☐ An author who has written a book has also contributed an

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article.



### Answer-Selection Feedback

The multiplicity of 0..\* on the Author end of association Writes says that each book may have any number of authors, including none.

### Problem Explanation

Notation "m..n" on the C1 end of an association between classes C1 and C2 says: given an object O of class C2, at least m and at most n objects of class C1 are related to object O. Notation "m..\*" says there is no upper limit. Notation "0..n" says there no lower limit (i.e., there may be "dangling" C2 objects that don't participate in the association). Notation "0..\*" means there are no restrictions on multiplicity at all.

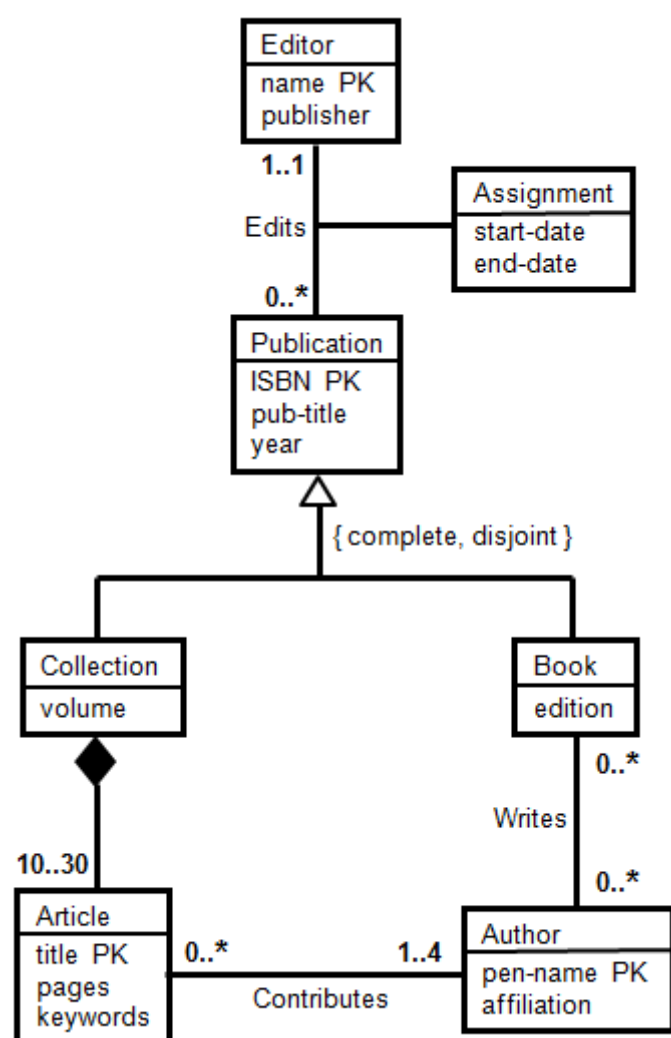
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## Q3

1/1 point (graded)

[Q3]



Based on this UML diagram, which of the following relations best represents articles?

☐ Article(title, pages, keywords, volume, ISBN, pub-title, year)

☒ Article(title, pages, keywords, ISBN)

☐ Article(title, pages, keywords, ISBN, volume)

☐ Article(title, pages, keywords, volume)

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Article(title, pages, keywords, volume,



### Answer-Selection Feedback

Article is the included class in a Composition relationship. Thus, its relation should contain the attributes of Article, plus the key of its including class. The including class Collection inherits its key (ISBN) from its superclass.

### Problem Explanation

Composition, indicated by a filled-in diamond, says that objects in one class (in this case Collection) include a set of objects in another class (in this case Article). The included objects (Article) are best represented by a relation containing the attributes of the included class along with the primary key of the including class (Collection). Because the included class in this case is a subclass, its primary key is inherited from its superclass. Thus, the primary key of Collection is ISBN, and the attributes of relation Article should be the attributes of class Article plus ISBN.

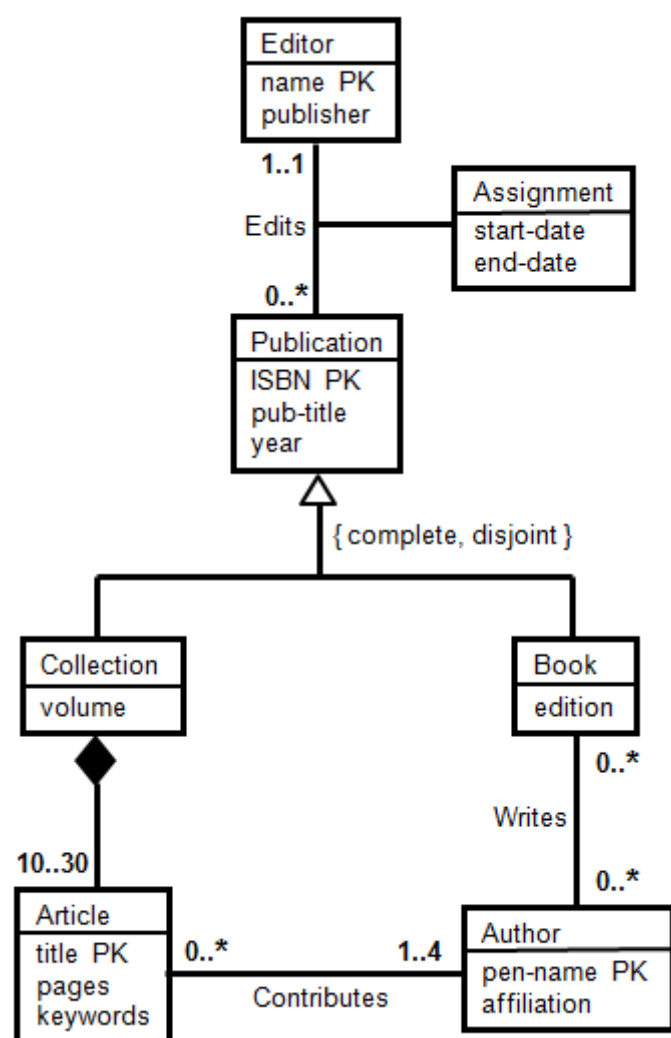
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## Q4

1/1 point (graded)

[Q4]



Consider translating this UML diagram to relations. In the relation Edits generated from the Edits association, which of the following set of underlined attributes is a minimal key?

☐ Edits(name, ISBN, start-date, end-date)

☐ Edits(name, ISBN, start-date, end-date)

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☒ Edits(name, ISBN, start-date, end-date)

☐ Edits(name, ISBN, start-date, end-date)



### Answer-Selection Feedback

The default key in the relation generated from an association is the combination of the PKs from the two classes in the association. When the association is many-one, the key can be made even smaller by eliminating the PK from the *one* side of the many-one association.

### Problem Explanation

The default key in the relation generated from an association is the combination of the PKs from the two classes in the association (in this case name from Editor and ISBN from Publication). However, when the association is many-one, then the PK from the *many* side (i.e., the side opposite the 0..1 or 1..1 multiplicity) is a key on its own.

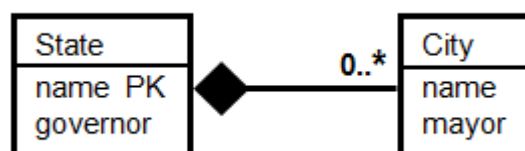
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## Q5

1/1 point (graded)

[Q5]



Based on this UML diagram, which of the following statements about the City and State classes is correct?

☐ No two cities can have the same name.

☐ No two cities can have the same mayor.

☐ Each city can be in zero or one states.

☒ Each city is in exactly one state.



### Answer-Selection Feedback

The filled-in diamond represents composition, which has an implicit multiplicity of 1..1 on the diamond side. So each city object must belong to exactly one state object.

### Problem Explanation

Composition, indicated by a filled-in diamond, says that objects in one class (in this case State) may include a set of objects in another class (in this case City). Each object in the "included" class must belong to exactly one object in the "including" class, i.e., there is an implicit 1..1 multiplicity on the diamond side. Also in this

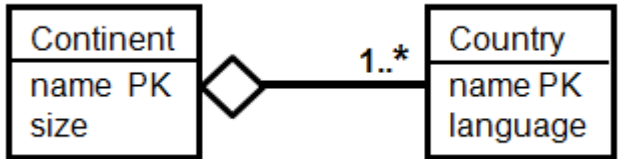
diagram, every State must have a unique name since name is designated as PK, but no other uniqueness constraints apply.

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**i** Answers are displayed within the problem

Q6

1/1 point (graded)  
[Q6]



Based on this UML diagram, which of the following statements about the Continent and Country classes is correct?

- ☐ Each country must belong to a continent.
- ☐ A continent may have no countries.
- ☐ A country can be in two different continents.
- ☒ A country may be in no continent.



**Answer-Selection Feedback**

The hollow diamond represents aggregation, which has an implicit multiplicity of 0..1 on the diamond side. So each country object may belong to zero or one continent objects.

**Problem Explanation**

Aggregation, indicated by a hollow diamond, says that objects in one class (in this case Continent) may include a set of objects in another class (in this case Country). Objects in the "included" class belong to at most one object in the "including" class but they may also belong to no object, i.e., there is an implicit 0..1 multiplicity on the diamond side. Every Continent must have a unique name among continents, since name is designated as PK, and similarly for every Country; no other uniqueness constraints apply.

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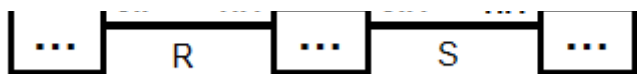
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Q7

1/1 point (graded)  
[Q7]

**A** 0..\* 1..1 **B** 0..1 1..1 **C**

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This UML diagram puts some constraints on the cardinalities of classes A, B, and C. Which of the following combinations of cardinalities is permitted? (Note: The cardinality of a class C, denoted  $|C|$ , indicates the number of objects in the class.)

☒  $|A| = 0; |B| = 0; |C| = 1$

☐  $|A| = 0; |B| = 10; |C| = 1$

☐  $|A| = 1; |B| = 0; |C| = 1$

☐  $|A| = 0; |B| = 20; |C| = 10$



**Problem Explanation**

Association S says that for each B there is exactly one C, and for each C there is at most one B. Thus,  $|B| \leq |C|$ . Association R says that for each A there is exactly one B. Thus, if there are any A's at all, then there must be at least one B. However, there are no other constraints relating  $|A|$  and  $|B|$ .

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Answers are displayed within the problem

**Q8**

0/1 point (graded)

[Q8] Suppose there is a UML superclass Movies with subclasses. Consider the following possible pairs of subclasses:

1.  $\{B, NB\}$ : B = movies in which Kevin Bacon appears; NB = movies in which Kevin Bacon does not appear
2.  $\{B, R\}$ : B = movies in which Kevin Bacon appears; R = movies in which Julia Roberts appears

< Previous

Next >





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