Quiz09 Solutions

FD Properties

1. Select all the FD's that follow from Armstrong's Axioms *

if X → Y and Z → W, then XZ → YW
if X → Y and WY → Z, then WX → Z
if X → YZ, then X → Y and X → Z
if XZ → YZ, then X → Y (Incorrect)
if X → Y and W → Y, then X → W (Incorrect)

FD Example

We have a relation R(A, B, C, D, E). We are told that the set of functional dependencies is F = {E → BC, A → B, C → D, AD → C}.

Find the attribute closures for each of the attributes. If the attribute closure for X was WXZ, you would fill in "WXZ" without quotes in the answer box.

We will be grading with a script so *please submit your answers in alphabetical order* and without any whitespace.

2. A+: AB
3. B+: B
4. C+: CD
5. D+: D
6. E+: BCDE

7. Select the attribute set(s) that are keys for relation R *

- E (Incorrect)
- ABC (Incorrect)
- BCD (Incorrect)
- **ACE (superkey)**
- **ABCDE (superkey)**

8. The attribute closure of (AD)+ is equivalent to the attribute closure of (AC)+. *

True. AD+ covers ABCD, AC+ covers ABCD.

9. Is relation R already in Boyce-Codd Normal Form (BCNF)? *

No. - None of the the FDs are a superkey of R and none of them are trivial FDs.

Normalization

Assume the decomposition is performed using the algorithm described in lecture.

10. Putting a relation in Boyce-Codd Normal Form will always guarantee a dependency preserving decomposition.
False

11. Putting a relation in Boyce-Codd Normal Form (BCNF) will always guarantee a lossless decomposition.
True

12. Determine whether the decomposition is lossless or not.
If relation R(A, B, C, D, E) is decomposed into R(A, C, D) and R(A, B, C, E) with the set of functional dependencies F = {BC → A, C → D}. Note: the decomposition might not follow the BCNF algorithm discussed in class.
We see that R1 ∩ R2 is AC. Since, since the FD AC →ACD is in F+, then the decomposition is lossless.