8.1

$r_1 \cap r_2 = A$ and $A \rightarrow r_1$, which means $r_1 \cup r_2 \rightarrow r_1$, and this decomposition is lossless.

8.13

There is no such a dependency $B \rightarrow \alpha$ in F_1^+ and a dependency $\alpha \rightarrow D$ in F_2^+, so the dependency $B \rightarrow D$ cannot be preserved by this decomposition.

8.19

(*A*, *B*, *C*, *E*)

(*B*, *D*)

8.20

(*A*, *B*, *C*, *E*)

(*B*, *D*)

A relation in BCNF is also in 3NF.

8.29

a

$B \rightarrow D \rightarrow AD \rightarrow ABCD \rightarrow ABCDE$

That is, $B^+ = ABCDE$

b

$A \rightarrow ABCD \text{ (Augmentation with A)}$

$ABCD \rightarrow ABCDE \text{ (Augmentation with ABCD)}$

$A \rightarrow ABCDE \text{ (Transitivity)}$

$AF \rightarrow ABCDEF \text{ (Augmentation)}$

c

Remove extraneous D:

$A \rightarrow BC$

$BC \rightarrow E$

$B \rightarrow D$

$D \rightarrow A$

Then remove extraneous C and combine:

$A \rightarrow BC$

$B \rightarrow DE$

$D \rightarrow A$

d

Use the algorithm:

(*A*, *B*, *C*)

(*B*, *D*, *E*)

(*D*, *A*)

(*B*, *F*)

e

Use the algorithm:

(*A*, *B*, *C*, *D*)

(*B*, *E*)

(*B*, *F*) (primary key)

f

No. Unless we can use F^+ inferred from the canonical cover.