a.R(A,B,C,D,E)

X = D

X+ = {D, B}

R1(D, B) BCNF because: D+ = D, B ; B+ = B

R2(A,C,D,E) BCNF because: CE→A is already in BCNF in R2, it doesn’t need further decomposition

b.S(A,B,C,D,E)

X = A

X+ = {A, E}

R1(A, E) BCNF because: A+ = A, E ; E+ = E

R2(A,B,C,D)

X = B, C

X+ = {B, C, A}

R3(B, C, A) BCNF because: (B, C)+ = B, C, A ; A+ = A

R4(B, C, D)

c. All trivial dependencies.

A -> A, B -> B, C -> C, D -> D

AB -> AB, AC -> AC, AD -> AD, BC -> BC, BD -> BD, CD -> CD

ABC -> ABC, ABD -> ABD, ACD -> ACD, BCD -> BCD

ABCD -> ABCD

d. A -> ABCD, B -> ABCD, C -> ABCD, D -> ABCD

e. B -> C, C -> B, A -> D, D -> A, AD -> BC