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HW7

1)

All candidate keys must contain C because C is never on the right side of a FD.
CE and CG cannot be candidate keys because all information cannot be derived from them.
AC+=BC+=CD+={A,B,C,D,E,G}
Therefore candidate keys are AC, BC, CD

2)

For example, R=(1,2,3) which breaks down into R1 = (1,2) and R2 = (2,3). Here, there is no way to reconstruct (1,2,3) from (1,2) and (2,3) because there is no dependency that describes how to combine these tuples. If B→C were added, this decomposition would be lossless.

3)

Because B→C then B→BC. Since B is the intersection of R1 and R2 and B determines R2, this decomposition is lossless. If you were to naturally join these two relations, you would be left with the original tuple (A,B,C).

4)

R = (A, B, C, D, E, G) and let F be {A → BDG, BG → DE, B → D, D → A}
I assume that you are asking for a decomposition.
R can be losslessly decomposed into R1=(A,B,D,G) R2=(B,C) R3=(A,C,D,E), which is in 3NF.
I don't believe it can be decomposed into BCNF.