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605.441 Problem Set 7

1. (10.6) We cannot infer a functional dependency from a particular relation state because later addition of a tuple may break any dependency that we infer. This means we can only generate functional dependencies from information not contained in a relation state.

2. (10.18)

   (a) We're given that $\{W \rightarrow Y, X \rightarrow Z\}$ So from the augmentation rule we can say that $WX \rightarrow YX$ and from projective rule this implies that $WX \rightarrow Y$.

   (b) (10.18e) This is false as can be seen from this instance

X	Y	Z
x1	y1	z1
x1	y2	z1

   (c) (10.18g) We're given that $\{X \rightarrow Y, Z \rightarrow W\}$. From the augmentation rule we can determine that $\{XZ \rightarrow YZ, YZ \rightarrow YW\}$ and then from the transitive rule we can see that $XZ \rightarrow YW$.

3. (10.21) A minimal set of dependencies would be {Ssn→Ename, Ssn→Bdate, Ssn→Address, Ssn→Dnumber, Dnumber→Dname, Dnumber→Dmgr_ssn }

4. (10.29) AB is not a candidate key for this relation because AB only functionally determines ABC, {AB→ABC}.
   ABD on the other hand would be a good candidate key because {ABD→ABCDE}, and neither AB, AD, or BD functionally determine all of the attributes ABCDE.