1.

a) All the keys for SDIM are: SD, SI

b) SDIM is in 2NF because the non-key attribute D depends on the candidate key S, and the non-key attribute M depends on the candidate key SD. But not in 3NF because there is a transitive dependency between D and M, as D depends on S and M depends on SD.

2.

F = {CS -> Z, Z -> C}

R1 = {SZ}, F1 = Ø

R2 = {CZ}, F2 = {Z -> C}

=> No preserve dependencies

3.

a) A minimal cover for F is:

F = {A→ D, BD→ C}

A→D and BD→C => AB→C is unnecessary

b) A 3NF, dependency-preserving decomposition of ABCD into only two schemes can be as follows:

* Scheme 1: ABD with the functional dependency A → D.
* Scheme 2: BCD with the functional dependencies BD → C

c) The projected dependencies for each scheme are:

* Scheme 1: A → D
* Scheme 2: BD → C

4.

a) A minimal cover for F is:

F = {A→BC} because A→B so AB→C is extra attribute B

b) Because in dependency of F function, we can not determine B→C dependency, but

in G there is B→C dependence, this is a violation.

5.

a) The reference of F on dependency (AB) is: A→B

The reference for F on dependencies (AC) is: A→C

The reference for F on dependencies (BD) is: Ø

b) Because we cannot deduce B→C and D→C from the reference of F on

decomposition dependencies, there is no functional dependency guaranteed.