CS 464/564 Spring 2019 Quiz 6 **Name:** Ethan Booker

1. Find a minimal cover for the following FD set

FDs = { FGH -> I, FI -> H, DI -> G, DH -> EG, I -> F, H -> F}

1) Decomposition

FGH -> I
FI -> H
DI -> G
DH -> E
DH -> G
I -> F
H -> F

2) Redundant LHS

FGH -> FG (removed H) -> FG+ = FG
FGH -> FH (removed G) -> FH+ = FH
FGH -> GH (removed F) -> GH+ = GHFI [redundant]
FI -> F (removed I) -> F+ = F
FI -> I (removed F) -> I+ = IFH [redundant]
DI -> D (removed I) -> D+ = D
DI -> I (removed F) -> I+ = IFH
DH -> D (removed H) -> D+ = D
DH -> H (removed D) -> H+ = HF

FGH replaced by GH
FI replaced by I

3) Remove redundant dependencies

GH -> I => GH+ = GHF
I -> H => I+ = IF
DI -> G => DI+ = DIHEGF [redundant]
DH -> E => DH+ = DHGIF
DH -> G => DH+ = DHE
I -> F => I+ = IHF [redundant]
H -> F => H+ = H

4) Combine common LHS

GH -> I
I -> H
DH -> EG
H -> F

Without combining

GH -> I
I -> H
DH -> E
DH -> G
H->F

2. Use the universal table and the **Minimal Cover** FD shown below to answer parts a, b and c.
Universal Table BCDFGH
Minimal cover FD set {BG -> C, G -> F, C -> H, C -> G, F->D}

a. Find a key for the universal table.

A potential key is: B, C

C+ = CHGFD

b. Is the decomposition of BCDFGH into GFD and BGCH lossless? Justify your answer.

Given that we can intersect GFD and BGCH on G which means we can do a natural join on both of them, we preserve lossless decomposition

c. Use 3NF synthesis to create a set of 3NF tables.

Combine LHS

C->HG
BG->C
G->F
F->D

R1 = {C, H, G}
R2 = {B, G, C}
R3 = {G, F}
R4 = {F, D}

R2 = {B, G, C} -> BGC+ = BGCHFD