Quiz 5 Solution
Let \( R = \{A, B, C, D, E, F, G\} \)
Let the FD set be
AB \( \rightarrow \) CE
A \( \rightarrow \) DF
CE \( \rightarrow \) DF
F \( \rightarrow \) G

After step 1
AB \( \rightarrow \) C
AB \( \rightarrow \) E
A \( \rightarrow \) D
A \( \rightarrow \) F
CE \( \rightarrow \) D
CE \( \rightarrow \) F
F \( \rightarrow \) G

\( A+ = ADFG \)
\( B+ = B \)
\( C+ = C \)
\( E+ = E \)

After step 2
AB \( \rightarrow \) C
AB \( \rightarrow \) E
A \( \rightarrow \) D
A \( \rightarrow \) F
CE \( \rightarrow \) D
CE \( \rightarrow \) F
F \( \rightarrow \) G
Quiz 5 Solution
Minimal Cover Step 3 and 4

<table>
<thead>
<tr>
<th>Rule</th>
<th>Expression</th>
<th>After step 3 Rule</th>
<th>Expression</th>
<th>After step 4 Rule</th>
</tr>
</thead>
<tbody>
<tr>
<td>AB -&gt; C</td>
<td>AB+ = ABDEFG</td>
<td>AB -&gt; C</td>
<td>AB+ = ABCDFG</td>
<td>AB -&gt; CE</td>
</tr>
<tr>
<td>AB -&gt; E</td>
<td>AB+ = ABCDFG</td>
<td>AB -&gt; E</td>
<td>A+ = AFG</td>
<td>A -&gt; DF</td>
</tr>
<tr>
<td>A -&gt; D</td>
<td>A+ = AFG</td>
<td>A+ = AD</td>
<td>A -&gt; D</td>
<td>C -&gt; DF</td>
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<tr>
<td>A -&gt; F</td>
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<td>A+ = AD</td>
<td>A -&gt; F</td>
<td>CE -&gt; DF</td>
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<tr>
<td>CE -&gt; D</td>
<td>CE+ = CEFG</td>
<td>CE -&gt; D</td>
<td>CE -&gt; D</td>
<td>F -&gt; G</td>
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<tr>
<td>CE -&gt; F</td>
<td>CE+ = CED</td>
<td>CE -&gt; F</td>
<td>CE -&gt; F</td>
<td>F -&gt; G</td>
</tr>
<tr>
<td>F -&gt; G</td>
<td>F+ = F</td>
<td>F+ = F</td>
<td>F+ = F</td>
<td>F+ = F</td>
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Quiz 5 Solution
3NF Synthesis step 2 and 3

<table>
<thead>
<tr>
<th>Minimal Cover</th>
<th>After step 2</th>
<th>After step 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>AB -&gt; CE</td>
<td>R1 = {A, B, C, E}</td>
<td>R1 = {A, B, C, E}</td>
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<tr>
<td>A -&gt; DF</td>
<td>R2 = {A, D, F}</td>
<td>R2 = {A, D, F}</td>
</tr>
<tr>
<td>CE -&gt; DF</td>
<td>R3 = {C, E, D, F}</td>
<td>R3 = {C, E, D, F}</td>
</tr>
<tr>
<td>F -&gt; G</td>
<td>R4 = {F, G}</td>
<td>R4 = {F, G}</td>
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ABCE+ = ABCEDFG
Optional Question: Write a trigger called checkStaff. The trigger is called when the mid column in the Staff table is changed. The trigger checks that the new manager (mid) works in the same library as the staff member(s) he/she manages. That is in the new row or rows the library of the mid (also a staff member) must be the same as the library of the sid. If the update is consistent (i.e. the library of the sid and mid are the same) the update succeeds otherwise it fails.

```
create or replace function checkStaff() returns trigger AS $$
Declare
    sidLib Integer;
    midLib Integer;
Begin
    select libnum into sidLib from staff where sid = NEW.sid;
    select libnum into midLib from staff where sid = NEW.mid;
    if sidLib != midLib then
        raise exception '% and % do not work in the same library', NEW.sid, NEW.mid;
    end if;
    return NEW;
End;
$$ Language plpgsql;

create or replace trigger checkStaff before update of mid on Staff
For each row execute procedure checkStaff();
```