F X

$AB \rightarrow C$
$BC \rightarrow A$
$BC \rightarrow D$
$D \rightarrow E$
$CF \rightarrow B$

$= ABCDE$

$= \boxed{ABFCDE}$

$\{AB\}^+$

CF^+ $= \boxed{CFBADE}$

ABF^+

$ABF,$

CF

Input: X, F
Output: X^+

$X^+ := X;$
repeat
$oldX^+ := X^+$
for each fd Y→Z in F do
if X^+ is superset of Y then
       $X^+ := X^+ \cup Z;$
until ($X^+ = oldX^+$);

yes | NO

$\boxed{AB \rightarrow F}$

AB^+ F

1 R(ABCD), F = {AB → C, AC → D}
2 R(ABCDE), F = {AB →C, CD → E}
3 R(ABCDE), F = {A → B, C → D, AC → E}
4 R(A,B,C,D,E,F), F = {AB → C, BC → AD, D → E, CF → B}
5 R(CourseNo, Sem, AcadYear, InstructorID, StudentID, Grade).
Identify FDs yourself.

R1

$AB \to C$

$AC \to D$

$AB^+ = ABCD$ ✓

$AC^+ = ACD$

R(ABCD), F = {AB → C, AC → D}
R(ABCDE), F = {AB →C, CD → E}
R(ABCDE), F = {A → B, C → D, AC → E}
R(A,B,C,D,E,F), F = {AB → C, BC → AD, D → E, CF → B}
R(CourseNo, Sem, AcadYear, InstructorID, StudentID, Grade).
Identify FDs yourself.

$AB \rightarrow C$

$CD \rightarrow E$

ABC

CDE

$ABD^+ = ABDCE$

$R(ABCDE)$

$A \rightarrow BC$

$B \rightarrow D$

$AE^+ = AEBCD$

R(ABCD), F = {AB → C, AC → D}
R(ABCDE), F = {AB →C, CD → E}
R(ABCDE), F = {A → B, C → D, AC → E}
R(A,B,C,D,E,F), F = {AB → C, BC → AD, D → E, CF → B}
R(CourseNo, Sem, AcadYear, InstructorID, StudentID, Grade).
Identify FDs yourself.

$\{CNO, \text{Acadyr}, \text{Sem}\} \rightarrow \text{InstructorId}$

$\{CN, \text{Acadyr}, \text{Sem}, SID\}^+ \rightarrow \text{grade}$

Key: Minimal
Set of attribute
X,

$$X^+ = R$$

$\{A \rightarrow BC, B \rightarrow C, A \rightarrow B, AB \rightarrow C \}$

$\{ B \rightarrow A, D \rightarrow A, AB \rightarrow D\}$

$\{ AB \rightarrow C, B \rightarrow D, D \rightarrow A\}$

$\{ AB \rightarrow CD, B \rightarrow C, C \rightarrow D\}$

$\rightarrow \{ A \rightarrow BC, B \rightarrow C, A \rightarrow B, AB \rightarrow C\}$

$\{ ABC \rightarrow D, A \rightarrow B \}$

$A \rightarrow B$

~~$A \rightarrow C$~~ ✓

$B \rightarrow C$

~~$A \rightarrow B$~~

~~$AB \rightarrow C$~~

$\Rightarrow$

$A \rightarrow B$

$B \rightarrow C$

Key
———
A

$AeBD$

$Ae^{+} =$ ✓

Ae