4.12 For the database of Figure 4.11, write a query to find those employees with no manager. Note that an employee may simply have no manager listed or may have a null manager. Write your query using an outer join and then write it again using no outer join at all.

*employee* (*employee name*, *street*, *city*)  
*works* (*employee name*, *company name*, *salary*)  
*company* (*company name*, *city*)  
*manages* (*employee name*, *manager name*)  
**Figure 4.11** Employee database for Figure 4.7 and 4.12

Solution:

1.using natural outer join

***select*** employee\_name

***from*** employee ***natural*** ***left*** ***outer*** ***join*** manages

***where*** manger\_name ***is*** ***null***

2.without using outer join

***select*** employee\_name

***from*** employee e

***where*** ***not*** ***exits*** (***select*** employee\_name ***from*** manages m

***where*** e.employee\_name = m.employee\_name ***and***

m.manger\_name ***is*** ***not*** ***null***)

4.14 Show how to define a view tot\_credits (year, num credits), giving the total number of credits taken by students in each year.

Solution:

***create*** ***view*** tot\_credits(year, num, credits)

***as*** (***select*** year, ***sum***(credits) ***from*** takes ***natural*** ***join*** course ***group*** ***by*** year)

4.16 Referential-integrity constraints as defined in this chapter involve exactly two relations. Consider a database that includes the relations shown in Figure 4.12. Suppose that we wish to require that every name that appears in address appears in either salaried worker or hourly worker, but not necessarily in both.  
a. Propose a syntax for expressing such constraints.  
b. Discuss the actions that the system must take to enforce a constraint of this form.

*Salaried\_worker* (*name, office, phone, salary*)  
*hourly\_worker* (*name, hourly wage*)  
*address* (*name, street, city*)  
**Figure 4.12** Employee database for Exercise 4.16.

Solution:

a.添加约束

***foreign key***(name) ***references*** salaried\_worker ***or*** hourly\_worker

b.

插入新的address时，必须要检查name是否在salaried\_worker或者hourly\_worker中存在