Alyssa Pustilnik Databases HW2

①

a) $\Pi_D(T_2)$

D
8
9

b) $T_1 \bowtie_{T_1.C = T_2} T_2$ → conditional join

A	(B)	C	(B)	D
1	a	2	b	8
1	a	2	b	9
2	b	2	b	8
2	b	2	b	9

c) $T_1 \bowtie T_2$ → natural join

A	B	C	D
2	b	2	8
2	b	2	9

d) $T_1 - T_2$

A	B	C
1	a	2
2	b	2
3	c	3

e) $(T_1 \bowtie T_2) \bowtie (T_2 \bowtie T_2)$

(natural join) (natural join)

A	B	C	D
2	b	2	8
2	b	2	9

$\bowtie$

A	B	D
1	b	8
1	b	8
2	b	9

=

A	B	C	D
2	b	2	8
2	b	2	9

② a) Find title and year of every pair of movies that have at least 1 star in common

- (stars x star) → need two of each

$\bowtie$

$\rho(S(1 \to s_1, 2 \to t_1, 3 \to y_1, 4 \to s_1, 5 \to t_1, 6 \to y_1)$ (stars x stars)

$$\Pi_{t_1, y_1, t_1, y_1}(\sigma_{S.s = S.s_1 \wedge S.y = S.y_1 \wedge S.t = S.t_1}(S))$$

b) Find name of each star never acted more than 1 movie in any 1 year

↳ easier to find more then subtract *

→ same thing

$$\Pi_{\text{studioname}}(S - \sigma_{S.s = S.s_1 \wedge S.t != S.t_1 \wedge S.y = S.y_1}(S))$$

2(c) Find name of each star acted in every "Paramount" 2000-2021

↳ every → division

$$Stars / \Pi_{title, year} \left(\sigma_{studioname = "Paramount" \wedge year < 2021 \wedge year > 2000} (Movies) \right)$$

3.1

```
SELECT prof.pname AS Professor_Name, prof.dname  AS Department
FROM prof, section
WHERE prof.pname = section.pname AND prof.dname <> section.dname
```

professor_name	department
Smith, S.	Industrial Engineering
Clark, E.	Civil Engineering

3.2

```
SELECT student.sid, sname AS Student_Name
FROM student, enroll
WHERE student.sid = enroll.sid AND grade >= 3.5
GROUP By student.sid, sname
HAVING COUNT(grade) >=2
```

sid	student_name
49	Villa-lobos, M.
64	Fred, Edwin B.
90	Zappa, F.
67	Altenhaus, Gloria

3.3

```
SELECT DISTINCT s.sname AS Student_Name, s.age AS Student_age
FROM student s
WHERE s.gpa = (SELECT MAX(gpa) FROM student WHERE age = s.age AND age<=18 )
```

*Two students age 18 have a gpa of 3.5

student_name	student_age
Baker, C.	18
News, Nightly	15
Zappa, F.	16
Morgan, D.	18

3.4

```
SELECT dept.dname AS department_name, AVG(gpa) AS average_gpa
FROM student, major, dept
WHERE student.sid = major.sid AND major.dname = dept.dname AND dept.dname LIKE
'%Engineering%'
GROUP BY dept.dname
HAVING COUNT(*) >= 2
```

department_name	average_gpa
Chemical Engineering	3.29999999566512
Civil Engineering	2.91428572365216
Industrial Engineering	2.76999999061227

3.5

```
SELECT c.dname AS department_name, c.cno AS course_number, COUNT(*) AS enrollment
FROM enroll c
GROUP BY c.dname, c.cno
HAVING COUNT(*) >= (1.03)*(SELECT COUNT(*)/COUNT(DISTINCT c1.cno)
                    FROM enroll c1
                    WHERE c1.dname = c.dname)
AND AVG(c.grade) >= (1.03)*(SELECT AVG(c2.grade)
                     FROM enroll c2
                     WHERE c2.dname = c.dname)
```

department_name	course_number	enrollment
Computer Sciences	726	17