ASSIGNMENT 6 - These problems are to be done by hand.
Hand-write and scan in, or type your solutions where indicated on these pages.

In this assignment you will use the following tables (relations):

JUNIORS:

sid	sname	 creditsSoFar 	gpa
301 302	Adam Betty Charlie	85 90	4 3.8 3.9

SENIORS:

4	L	+	
sid	•	creditsSoFar	•
402 403	Debbie Elaine Frank George	130 130	3.9 3.7 3.5 3.3
		L	

CLASSES:

+		++
cid	cname	ctype
501	465	CMPSC
502	202C	ENG
503	464	CMPSC
504	201	CMPSC
505	15	ENG
506	211	PHYS
+		++

TAKEN:

+		++
sid	cid	grade
+		++
302	502	A
302	501	A-
303	501	B+
401	501	B
401	506	B-
401	502	C+
404	503	D
404	501	F
+		++

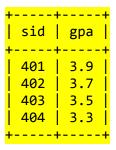
SYMBOLS: σ (Selection) Π (Projection) \bowtie (Join) $^{\land}$ (And)

PROBLEM 1:

Using the given tables & data, show, in table form, the results of the following algebra query:

∏ sid, gpa (SENIORS)

ANSWER:



What is the SQL statement you would use to do this?

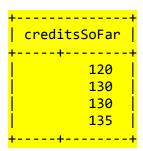
ANSWER:

SELECT sid, gpa from SENIORS;

PROBLEM 2:

Using the given tables & data, show, in table form, the results of the following algebra query:

ANSWER:



QUESTION: Do you have three rows or four? Why?

ANSWER:

4, because it's projecting columns from the SENIORS table.

What is the SQL statement you would use to do this? **ANSWER:**

SELECT crededitsSoFar from SENIORS;

PROBLEM 3:

Show, in table form, the results of the following algebra query:

JUNIORS U SENIORS

ANSWER:

sid	sname	creditsSoFar	gpa
301	Adam	85	4
302	Betty	90	3.8
303	Charlie	95	3.9
401	Debbie	120	3.9
402	Elaine	130	3.7
403	Frank	130	3.5
404	George	135	3.3
+	·	+	+

What is the SQL statement you would use to do this? **ANSWER:**

SELECT sid, sname, creditsSoFar, gpa FROM JUNIORS UNION SELECT sid, sname, creditsSoFar, gpa from SENIORS;

PROBLEM 4:

Show, in table form, the results of the following algebra query: $\sigma_{
m gpa} >$ 3.5 (SENIORS)

ANSWER:

	sname	creditsSoFar	
401	Debbie Elaine	120	3.9

What is the SQL statement you would use to do this? **ANSWER:**

SELECT S.sid, S.sname, S.creditsSoFar, S.gpa FROM SENIORS S WHERE S.gpa > 3.5;

PROBLEM 5:

Problem 5A:

Show, in table form, the results of the following algebra query:

ANSWER:

S.sid = T.sid	sname	creditsSoFar	gpa	cid	grade
401 401 401 404 404	Debbie Debbie Debbie George George	120 120 120 135 135	3.9 3.9 3.9 3.3	501 506 502 503 501	B B- C+ D F

What is the SQL statement you would use to do this? **ANSWER:**

SELECT * FROM SENIORS S, TAKEN T WHERE S.sid = T.sid;

Problem 5B:

Show, in table form, the results of the following algebra query:

JUNIORS ⋈s.sid = t.sid TAKEN

ANSWER:

S.sid = T.sid	 sname	creditsSoFar	+ gpa	+ cid	+ grade
	Betty Betty Charlie	90 90 95	3.8	502 501 501	: :

What is the SQL statement you would use to do this? **ANSWER:**

SELECT * FROM JUNIORS S, TAKEN T WHERE S.sid = T.sid;

PROBLEM 6:

Show, in table form, the results of the following algebra query:

SENIORS ⋈s.sid = t.sid TAKEN UNION

JUNIORS ⋈s.sid = t.sid TAKEN

ANSWER:

S.sid = T.sid	sname	creditsSoFar	gpa	cid	grade
401	Debbie	120	3.9	501	В
401	Debbie	120	3.9	506	B-
401	Debbie	120	3.9	502	C+
404	George	135	3.3	503	D
404	George	135	3.3	501	F
302	Betty	90	3.8	502	Α
302	Betty	90	3.8	501	A-
303	Charlie	95	3.9	501	B+
+					

What is the SQL statement you would use to do this? **ANSWER:**

SELECT * FROM SENIORS S, TAKEN T WHERE S.sid = T.sid UNION SELECT * FROM JUNIORS S, TAKEN T WHERE S.sid = T.sid;

PROBLEM 7:

Write the algebra query for this statement: Find the names of students who have taken the course with the id number of 502.

ANSWER:

```
\Pi_{\text{sname}} \quad (\sigma_{\text{t.cid=502}} \quad (\text{SENIORS} \bowtie \text{TAKEN}))
\Pi_{\text{sname}} \quad (\sigma_{\text{t.cid=502}} \quad (\text{JUNIORS} \bowtie \text{TAKEN}))
```

Show the results in tabular form: **ANSWER:**



What is the SQL statement you would use to do this?

ANSWER:

SELECT S.sname FROM SENIORS S, TAKEN T WHERE T.cid = 502 UNION SELECT S.sname FROM JUNIORS J, TAKEN T WHERE T.cid = 502;

1 point extra credit: Can you think of a different way to do this (just switching order does not count):

ALTERNATIVE ANSWER:

Nested Queries ?

SELECT S.sname FROM SENIOR S, TAKEN T WHERE T.cid = 502 AND T.cid IN (SELECT S2.sname FROM JUNIORS S2, TAKEN T2 WHERE T2.cid = 502);

PROBLEM 8:

Write the algebra query for this statement: Find the names of students who have taken CMPSC 465.

ANSWER:

```
\Pi_{\text{sname}} (\sigma_{\text{ctype=CMPSC ^ cname = 465}}(CLASSES \bowtie TAKEN \bowtie (JUNIOR U SENIOR)))
```

Show the results in tabular form: **ANSWER:**



What is the SQL statement you would use to do this? **ANSWER:**

SELECT sname FROM ((SELECT * FROM JUNIOR UNION SELECT * FROM SENIOR) NATURAL JOIN CLASSES NATURAL JOIN TAKEN) WHERE ctype = CMPSC AND cname = 465;

Note: Not sure about this.

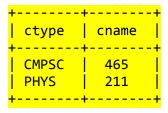
PROBLEM 9:

Write the algebra query for this statement: Find the courses (e.g., ENGL 202C) taken by anyone with a GPA greater than or equal to 3.9

ANSWER:

```
\Pi_{\text{ctype,cname}} (\sigma_{\text{gpa} \rightarrow= 3.9} (JUNIOR U SENIOR) \bowtie CLASSES \bowtie TAKEN)
```

Show the results in tabular form: **ANSWER:**



What is the SQL statement you would use to do this? **ANSWER:**

SELECT ctype, cname FROM ((SELECT * FROM JUNIOR) UNION (SELECT * FROM SENIOR) NATURAL JOIN (CLASSES NATURAL JOIN TAKEN)) WHERE gpa >= 3.9;

PROBLEM 10:

Write the algebra query for this statement: Find the name of all students who have taken at least one class.

ANSWER:

```
\Pi_{\text{sname}} (TAKEN \bowtie (JUNIOR U SENIOR))
```

Show the results in tabular form: **ANSWER:**



What is the SQL statement you would use to do this? **ANSWER:**

SELECT sname FROM (SELECT * FROM JUNIOR UNION SELECT * FROM SENIOR NATURAL JOIN TAKEN);

ONE POINT EXTRA CREDIT - PROBLEM 11:

Write the algebra query for this statement: Find the name of students who have taken at least one of ENG 202C, PHYS 211.

ANSWER:

```
\Pi_{\text{sname}} \left( \sigma_{\text{ctype = PHYS } ^{\land} \text{ cname = 211}} \left( \text{ TAKEN } \bowtie \text{ CLASSES } \bowtie \left( \text{JUNIOR U SENIOR} \right) \right) \right)
\text{ctype = ENG } ^{\land} \text{ cname = 202C}
```

Show the results in tabular form:

ANSWER:



What is the SQL statement you would use to do this? **ANSWER:**

SELECT sname FROM (SELECT * FROM JUNIOR UNION SELECT * FROM SENIOR NATURAL JOIN TAKEN NATURAL JOIN CLASSES) WHERE (ctype = PHYS AND cname = 211) OR (ctype = ENG AND cname = 202C);

Note: Not sure about this either.