

Name: _____

Please answer the following questions within the space provided on the following pages. Should you need more space, you can use scratch paper, but clearly label on the scratch paper what problem it corresponds to. While you are not required to explain your queries, comments may help me to understand what you were trying to do and thus increase the likelihood of partial credit should something go wrong. If you get entirely stuck somewhere, explain in words as much as possible what you would try.

This is a pen and paper exam, and thus computers and internet capable devices are prohibited. If you have any confusion about question intention or wording, please do not hesitate to ask!

Your work must be your own on this exam, and under no conditions should you discuss the exam or ask questions to anyone but myself. Failure to abide by these rules will be considered a breach of Willamette's Honor Code and will result in penalties as set forth by Willamette's academic honesty policy.

Please sign and date the below lines to indicate that you have read and understand these instructions and agree to abide by them. *Failure to abide by the rules will result in a 0 on the test.* Good luck!!

Signature

Date

Question:	1	2	3	4	Total
Points:	4	9	15	12	40
Score:					

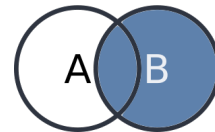
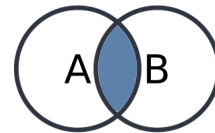
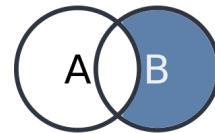
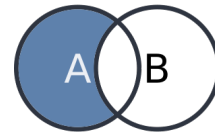
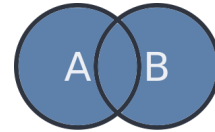
- (4) 1. Match each of the below queries with the Venn diagram that best depicts the results of the query. There are more Venn diagrams that queries, but each diagram with a match corresponds to only a single query.

```
SELECT *  
FROM A  
JOIN B  
  ON A.key = B.key;
```

```
SELECT *  
FROM A  
RIGHT JOIN B  
  ON A.key = B.key;
```

```
SELECT *  
FROM A  
LEFT JOIN B  
  ON A.key = B.key  
WHERE B.key IS NULL
```

```
SELECT *  
FROM A  
FULL OUTER JOIN B  
  ON A.key = B.key
```



- (9) 2. Suppose you have the three tables tab1, tab2, and tab3 defined and populated as seen below.

```
CREATE TABLE tab1 (
  A text PRIMARY KEY,
  B int,
  C int,
  D int,
  CHECK (B + C < D)
);

CREATE TABLE tab2 (
  E text REFERENCES tab1,
  F text,
  G text,
  PRIMARY KEY (E,F,G),
  FOREIGN KEY (F,G) REFERENCES tab3
);

CREATE TABLE tab3 (
  H date UNIQUE,
  I int NOT NULL,
  J text,
  K text,
  PRIMARY KEY (J,K)
);
```

tab1				tab2			tab3			
A	B	C	D	E	F	G	H	I	J	K
Bob	3	1	6	Jill	high	blue	2022-10-01	1	low	red
Jill	5	0	8	Greg	low	black	2022-01-30	5	high	blue
Jane	8	1	10	Lilly	high	green	2022-12-13	-2	low	blue
Greg	3	-2	4				2022-01-29	0	low	black
Lilly	4	5	10				2022-02-14	0	high	green

For each of the below statements, determine whether or not the statement would result in an error when run. If it would not result in an error, state as much, but if it would result in an error, state specifically what constraint is causing the error. All potential errors are related only to constraints, not to syntax. You can assume each of the below commands is run independently on the above tables (they can not affect one another).

- (a) `INSERT INTO tab2 VALUES ('Greg', 'low', 'blue');`

(b) `UPDATE tab3
SET H = H - '1 day'::interval
WHERE K = 'blue';`

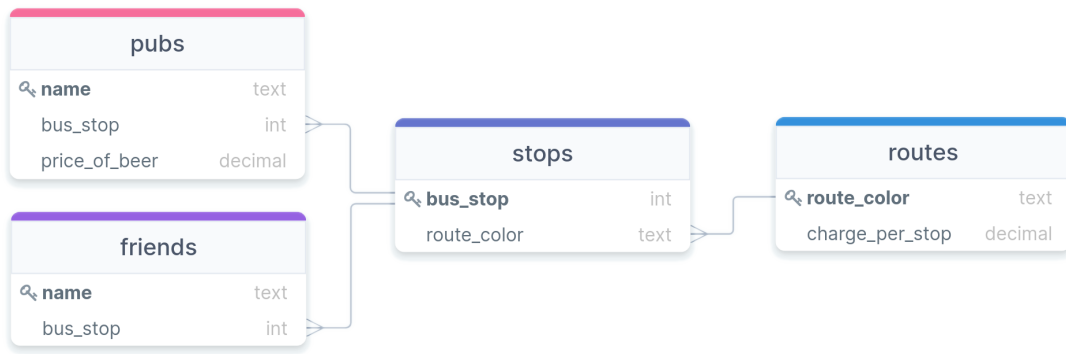
(c) `DELETE FROM tab2
WHERE E = 'Lilly';`

(d) `UPDATE tab1
SET B = B + 1
WHERE A ILIKE 'J%';`

(e) `ALTER TABLE tab1 ADD PRIMARY KEY (B);`

(f) `ALTER TABLE tab3 ADD FOREIGN KEY (I) REFERENCES tab1(C);`

3. In the spirit of St. Patrick's Day, you and some friends are looking to plan a fun evening out. You have gathered all the information you have about your friend's houses, local pubs, and bus stops and routes into the database shown in the below ERD. In your town, each bus stop happens to belong to only a single route and bus routes are named by colors.



Given this database, write out queries that could answer each of the following questions. All can be done in a single query, but you are free to use multiple queries if it helps.

- (5) (a) Which route (color) has the most pubs along it?

(5) (b) How many friends live on the most expensive (per stop) bus route?

(5) (c) If you were to ride the entirety of the “blue” route, hitting every stop and buying one beer at any pub that might be at that stop, what would the total price of your evening out be (including bus fare)?

4. Suppose you have the single table below (named `leprechauns`) containing highly classified information about a variety of leprechauns.

name	beard_color	coat_color	lucky_num
<i>text</i>	<i>text</i>	<i>text</i>	<i>int</i>
Lucky	red	green	4
Connor	blond	red	2
Sean	red	red	8
Aoife	white	green	4
Finley	brown	green	6
Teagan	red	red	10

From this information, determine the output of each of the following SQL queries. *Work must be shown along the way for any chance at partial credit.*

- (4) (a)

```
SELECT coat_color, MIN(beard_color)
FROM leprechauns
GROUP BY coat_color
HAVING SUM(lucky_num) > 15;
```

(4) (b) `SELECT`
 `lep1.name,`
 `lep2.name,`
 `lep1.lucky_num + lep2.lucky_num as total_luck`
`FROM` `leprechauns as lep1`
`JOIN` `leprechauns as lep2`
 `ON lep1.beard_color = lep2.coat_color AND`
 `lep1.name != lep2.name;`

(4) (c)

```
DELETE FROM leprechauns
WHERE beard_color = coat_color AND
      name NOT ILIKE '%g%';

ALTER TABLE leprechauns ADD COLUMN age text;
UPDATE leprechauns
SET age = (lucky_num + 24)::text;

DELETE FROM leprechauns
WHERE age ILIKE '2_';

ALTER TABLE leprechauns DROP COLUMN coat_color;

SELECT * FROM leprechauns;
```