

1 FINAL EXAM

2 3 4 5 Data Scientist Role Play: Profiling and Analyzing the Yelp Dataset Coursera Worksheet 6

7 This is a 2-part assignment. In the first part, you are asked a series of questions that will help you profile and understand the data just like a data scientist would. For this first part of the assignment, you will be assessed both on the correctness of your findings, as well as the code you used to arrive at your answer. You will be graded on how easy your code is to read, so remember to use proper formatting and comments where necessary. In the second part of the assignment, you are asked to come up with your own inferences and analysis of the data for a particular research question you want to answer. You will be required to prepare the dataset for the analysis you choose to do. As with the first part, you will be graded, in part, on how easy your code is to read, so use proper formatting and comments to illustrate and communicate your intent as required. For both parts of this assignment, use this "worksheet." It provides all the questions you are being asked, and your job will be to transfer your answers and SQL coding where indicated into this worksheet so that your peers can review your work. You should be able to use any Text Editor (Windows Notepad, Apple TextEdit, Notepad ++, Sublime Text, etc.) to copy and paste your answers. If you are going to use Word or some other page layout application, just be careful to make sure your answers and code are lined appropriately. In this case, you may want to save as a PDF to ensure your formatting remains intact for you reviewer.

8 9 10 11 Part 1: Yelp Dataset Profiling and Understanding 12

13 1. Profile the data by finding the total number of records for each of the tables below:
14

```
15 SELECT *  
16 FROM [table]  
17  
18 i. Attribute table = 10,000  
19 ii. Business table = 10,000  
20 iii. Category table = 10,000  
21 iv. Checkin table = 10,000  
22 v. elite_years table = 10,000  
23 vi. friend table = 10,000  
24 vii. hours table = 10,000  
25 viii. photo table = 10,000  
26 ix. review table = 10,000  
27 x. tip table = 10,000  
28 xi. user table = 10,000  
29  
30  
31  
32
```

33 2. Find the total distinct records by either the foreign key or primary key for each table. If two foreign keys are listed in the table, please specify which foreign key.
34

```
35  
36 SELECT COUNT (  
37     DISTINCT [PK/FK])  
38 FROM [table])  
39  
40 i. Business = id (PK - 10,000)  
41 ii. Hours = business_id (FK - 1,562)  
42 iii. Category = business_id (FK - 2,643)  
43 iv. Attribute = business_id (FK - 1,115)  
44 v. Review = id (PK - 10,000), business_id (FK - 8,090), user_id (FK - 9,581)  
45 vi. Checkin = business_id (FK - 493)  
46 vii. Photo = id (PK - 10,000), business_id (FK - 6,493)  
47 viii. Tip = user_id (FK - 537), business_id (FK - 3,979)  
48 ix. User = id (PK - 10,000)  
49 x. Friend = user_id (FK - 11)  
50 xi. Elite_years = user_id (FK - 2,780)  
51
```

52 Note: Primary Keys are denoted in the ER-Diagram with a yellow key icon.
53
54
55

56 3. Are there any columns with null values in the Users table? Indicate "yes," or "no."
57

58 Answer: No
59

60 SQL code used to arrive at answer:
61

```
62 SELECT COUNT (*)  
63 FROM user  
64 WHERE [column] IS NULL  
65  
66  
67
```

68 4. For each table and column listed below, display the smallest (minimum), largest (maximum), and average (mean) value
for the following fields:

69
70 SELECT MIN([column])
71 ,MAX([column])
72 ,AVG([column])
73 FROM [table]
74

75
76 i. Table: Review, Column: Stars
77

78 min: 1 max: 5 avg: 3.7082
79

80
81 ii. Table: Business, Column: Stars
82

83 min: 1.0 max: 5.0 avg: 3.6549
84

85
86 iii. Table: Tip, Column: Likes
87

88 min: 0 max: 2 avg: 0.0144
89

90
91 iv. Table: Checkin, Column: Count
92

93 min: 1 max: 53 avg: 1.9414
94

95
96 v. Table: User, Column: Review_count
97

98 min: 0 max: 2000 avg: 24.2995
99

100
101
102 5. List the cities with the most reviews in descending order:
103

104 SQL code used to arrive at answer:
105

106 SELECT city AS City
107 ,SUM(review_count) AS ReviewCount
108 FROM business
109 GROUP BY city
110 ORDER BY ReviewCount DESC
111

112
113 Copy and Paste the Result Below:
114

City	ReviewCount
Las Vegas	82854
Phoenix	34503
Toronto	24113
Scottsdale	20614
Charlotte	12523
Henderson	10871
Tempe	10504
Pittsburgh	9798
Montréal	9448
Chandler	8112
Mesa	6875
Gilbert	6380
Cleveland	5593
Madison	5265
Glendale	4406
Mississauga	3814
Edinburgh	2792
Peoria	2624
North Las Vegas	2438
Markham	2352
Champaign	2029
Stuttgart	1849
Surprise	1520
Lakewood	1465
Goodyear	1155

143
144 (Output limit exceeded, 25 of 362 total rows shown)
145
146

147
148 6. Find the distribution of star ratings to the business in the following cities:

149
150 i. Avon

151
152 SQL code used to arrive at answer:

153
154 SELECT city
155 ,COUNT(id) AS 'Businesses'
156 ,stars
157 FROM business
158 WHERE city LIKE 'Avon'
159 GROUP BY stars

160
161
162 Copy and Paste the Resulting Table Below (2 columns - star rating and count):

163
164 +-----+-----+-----+
165 | city | Businesses | stars |
166 +-----+-----+-----+
167 | Avon | 1 | 1.5 |
168 | Avon | 2 | 2.5 |
169 | Avon | 3 | 3.5 |
170 | Avon | 2 | 4.0 |
171 | Avon | 1 | 4.5 |
172 | Avon | 1 | 5.0 |
173 +-----+-----+-----+

174
175
176
177 ii. Beachwood

178
179 SQL code used to arrive at answer:

180
181 SELECT city
182 ,COUNT(id) AS 'Businesses'
183 ,stars
184 FROM business
185 WHERE city LIKE 'Beachwood'
186 GROUP BY stars

187
188
189 Copy and Paste the Resulting Table Below (2 columns - star rating and count):

190
191 +-----+-----+-----+
192 | city | Businesses | stars |
193 +-----+-----+-----+
194 | Beachwood | 1 | 2.0 |
195 | Beachwood | 1 | 2.5 |
196 | Beachwood | 2 | 3.0 |
197 | Beachwood | 2 | 3.5 |
198 | Beachwood | 1 | 4.0 |
199 | Beachwood | 2 | 4.5 |
200 | Beachwood | 5 | 5.0 |
201 +-----+-----+-----+

202
203
204
205 7. Find the top 3 users based on their total number of reviews:

206
207 SQL code used to arrive at answer:

208
209 SELECT name AS Name
210 ,review_count AS 'Review Count'
211 FROM user
212 GROUP BY id
213 ORDER BY review_count DESC
214 LIMIT 3

215
216
217 Copy and Paste the Result Below:

218
219 +-----+-----+
220 | Name | Review Count |
221 +-----+-----+
222 | Gerald | 2000 |
223 | Sara | 1629 |
224 | Yuri | 1339 |
225 +-----+-----+

226

227
228
229 8. Does posting more reviews correlate with more fans? Please explain your findings and interpretation of the results:
230

231 Not necessarily. A cursory examination of the data shows that Yelpers with
232 high review counts sometimes have fewer fans than Yelpers with lower review counts.
233

```
234 SELECT name AS Name
235 ,review_count AS ReviewCount
236 ,fans AS Fans
237 FROM user
238 ORDER BY review_count DESC
239
```

```
240 +-----+-----+-----+
241 | Name      | ReviewCount | Fans |
242 +-----+-----+-----+
243 | Gerald    | 2000        | 253  |
244 | Sara      | 1629        | 50   |
245 | Yuri      | 1339        | 76   |
246 | .Hon      | 1246        | 101  |
247 | William   | 1215        | 126  |
248 | Harald    | 1153        | 311  |
249 | eric      | 1116        | 16   |
250 | Roanna    | 1039        | 104  |
251 | Mimi      | 968         | 497  |
252 | Christine | 930         | 173  |
253 | Ed        | 904         | 38   |
254 | Nicole    | 864         | 43   |
255 | Fran      | 862         | 124  |
256 | Mark      | 861         | 115  |
257 | Christina | 842         | 85   |
258 | Dominic   | 836         | 37   |
259 | Lissa     | 834         | 120  |
260 | Lisa      | 813         | 159  |
261 | Alison    | 775         | 61   |
262 | Sui       | 754         | 78   |
263 | Tim       | 702         | 35   |
264 | L         | 696         | 10   |
265 | Angela    | 694         | 101  |
266 | Crissy    | 676         | 25   |
267 | Lyn       | 675         | 45   |
268 +-----+-----+-----+
```

269 (Output limit exceeded, 25 of 10000 total rows shown)
270
271
272

273 9. Are there more reviews with the word "love" or with the word "hate" in them?
274

275 Answer: Love
276

277
278 SQL code used to arrive at answer:
279

```
280 SELECT
281     (SELECT COUNT (*)
282     FROM review
283     WHERE text LIKE '%love%') AS LoveCount
284     ,(SELECT COUNT (*)
285     FROM review
286     WHERE text LIKE '%hate%') AS HateCount
287 FROM review
288 LIMIT 1
289
```

```
290 +-----+-----+
291 | LoveCount | HateCount |
292 +-----+-----+
293 | 1780      | 232      |
294 +-----+-----+
```

295
296
297
298 10. Find the top 10 users with the most fans:
299

300 SQL code used to arrive at answer:
301

```
302 SELECT name
303 ,fans
304 FROM user
305 GROUP BY id
306 ORDER BY fans DESC
```

307 LIMIT 10
308
309 Copy and Paste the Result Below:
310

```
311 +-----+-----+
312 | name      | fans |
313 +-----+-----+
314 | Amy        | 503 |
315 | Mimi       | 497 |
316 | Harald     | 311 |
317 | Gerald     | 253 |
318 | Christine  | 173 |
319 | Lisa       | 159 |
320 | Cat        | 133 |
321 | William    | 126 |
322 | Fran       | 124 |
323 | Lissa      | 120 |
324 +-----+-----+
```

325
326
327
328
329 Part 2: Inferences and Analysis

330
331 1. Pick one city and category of your choice and group the businesses in that city or category by their overall star rating. Compare the businesses with 2-3 stars to the businesses with 4-5 stars and answer the following questions. Include your code.

332
333 City: Toronto
334 Category: Restaurants
335

336
337 i. Do the two groups you chose to analyze have a different distribution of hours?
338 Four of the ten 'Restaurants' in Toronto do not have hours listed. Some open late morning and close before midnight, while others open in the evening and close after midnight.

```
339  
340 SELECT b.city AS 'City'  
341 ,b.name AS 'Business'  
342 ,h.hours AS 'Hours'  
343 ,c.category AS 'Category'  
344 FROM  
345     (business b INNER JOIN category c ON b.id = c.business_id)  
346     LEFT JOIN hours h ON b.id = h.business_id  
347 WHERE b.city LIKE 'Toronto'  
348 AND  
349 c.category LIKE 'Restaurants'  
350 GROUP BY b.id
```

```
351  
352 +-----+-----+-----+-----+
353 | City      | Business      | Hours      | Category      |
354 +-----+-----+-----+-----+
355 | Toronto   | Mama Mia      | None       | Restaurants    |
356 | Toronto   | Cabin Fever   | Saturday|16:00-2:00 | Restaurants    |
357 | Toronto   | Royal Dumpling| None       | Restaurants    |
358 | Toronto   | Big Smoke Burger| Saturday|10:30-21:00 | Restaurants    |
359 | Toronto   | Sushi Osaka   | Saturday|11:00-23:00 | Restaurants    |
360 | Toronto   | Pizzaiolo     | Saturday|10:00-4:00  | Restaurants    |
361 | Toronto   | 99 Cent Sushi | Saturday|11:00-23:00 | Restaurants    |
362 | Toronto   | The Kosher Gourmet| None       | Restaurants    |
363 | Toronto   | Naniwa-Taro   | None       | Restaurants    |
364 | Toronto   | Edulis        | Saturday|18:00-23:00 | Restaurants    |
365 +-----+-----+-----+-----+
```

```
366  
367  
368 SELECT b.city AS 'City'  
369 ,COUNT(b.id) AS 'Business'  
370 ,h.hours AS 'Hours'  
371 ,c.category AS 'Category'  
372 FROM  
373     (business b INNER JOIN category c ON b.id = c.business_id)  
374     LEFT JOIN hours h ON b.id = h.business_id  
375 WHERE b.city LIKE 'Toronto'  
376 AND  
377 c.category LIKE 'Restaurants'  
378 GROUP BY h.hours
```

```
379  
380 +-----+-----+-----+-----+
381 | City      | Business      | Hours      | Category      |
382 +-----+-----+-----+-----+
383 | Toronto   | 4             | None       | Restaurants    |
```

384	Toronto	1	Friday 10:30-21:00	Restaurants
385	Toronto	2	Friday 11:00-23:00	Restaurants
386	Toronto	1	Friday 18:00-23:00	Restaurants
387	Toronto	1	Friday 18:00-2:00	Restaurants
388	Toronto	1	Friday 9:00-4:00	Restaurants
389	Toronto	1	Monday 10:30-21:00	Restaurants
390	Toronto	2	Monday 11:00-23:00	Restaurants
391	Toronto	1	Monday 16:00-2:00	Restaurants
392	Toronto	1	Monday 9:00-23:00	Restaurants
393	Toronto	1	Saturday 10:00-4:00	Restaurants
394	Toronto	1	Saturday 10:30-21:00	Restaurants
395	Toronto	2	Saturday 11:00-23:00	Restaurants
396	Toronto	1	Saturday 16:00-2:00	Restaurants
397	Toronto	1	Saturday 18:00-23:00	Restaurants
398	Toronto	1	Sunday 10:00-23:00	Restaurants
399	Toronto	1	Sunday 11:00-19:00	Restaurants
400	Toronto	1	Sunday 11:00-23:00	Restaurants
401	Toronto	1	Sunday 12:00-16:00	Restaurants
402	Toronto	1	Sunday 14:00-23:00	Restaurants
403	Toronto	1	Sunday 16:00-2:00	Restaurants
404	Toronto	1	Thursday 10:30-21:00	Restaurants
405	Toronto	2	Thursday 11:00-23:00	Restaurants
406	Toronto	1	Thursday 18:00-23:00	Restaurants
407	Toronto	1	Thursday 18:00-2:00	Restaurants

408 +-----+-----+-----+-----+-----+

409 (Output limit exceeded, 25 of 35 total rows shown)

410
411
412

413 ii. Do the two groups you chose to analyze have a different number of reviews?

414 Yes. Restaurants outside of Toronto appear to have a little more than double the average reviews than restaurants in Toronto (68.9 vs 29.9).

415
416

417 iii. Are you able to infer anything from the location data provided between these two groups? Explain.

418 Yes. 50% of Toronto restaurants have 4-5* reviews compared to 40% of restaurants outside Toronto. Therefore, you are more likely (though only slightly) to have a higher restaurant star rating in Toronto than outside Toronto.

419
420

421 SQL code used for analysis:

422

423 SELECT

424 ((SELECT COUNT(b.stars) --Counts # of Toronto rest. w/ 2*-3* reviews

425 FROM business b INNER JOIN category c ON b.id = c.business_id

426 WHERE b.city LIKE 'Toronto'

427 AND

428 c.category LIKE 'Restaurants'

429 AND

430 b.stars BETWEEN 2.0 AND 3.0)

431 ||'/'||

432 (SELECT COUNT(b.stars) --Counts # of Toronto rest. w/ 4*-5* reviews

433 FROM business b INNER JOIN category c ON b.id = c.business_id

434 WHERE b.city LIKE 'Toronto'

435 AND

436 c.category LIKE 'Restaurants'

437 AND

438 b.stars BETWEEN 4.0 AND 5.0)

439 ||'/'||

440 (SELECT COUNT(b.stars) --Counts total # of reviewed Toronto rest

441 FROM business b INNER JOIN category c ON b.id = c.business_id

442 WHERE b.city LIKE 'Toronto'

443 AND

444 c.category LIKE 'Restaurants'))

445 AS 'Toronto Rest. 2-3*/4-5*/All'

446 ,(SELECT SUM(b.review_count) --Counts total # of Toronto rest. reviews

447 FROM business b INNER JOIN category c ON b.id = c.business_id

448 WHERE b.city LIKE 'Toronto'

449 AND

450 c.category LIKE 'Restaurants')

451 AS 'Toronto Rest. Total Reviews'

452 ,((SELECT COUNT(b.stars) --Counts # of all rest. outside Toronto w/ 2*-3* reviews

453 FROM business b INNER JOIN category c ON b.id = c.business_id

454 WHERE b.city NOT LIKE 'Toronto'

455 AND

456 c.category LIKE 'Restaurants'

457 AND

458 b.stars BETWEEN 2.0 AND 3.0)

459 ||'/'||

460 (SELECT COUNT(b.stars) --Counts # of all rest. outside Toronto w/ 4*-5* reviews

461 FROM business b INNER JOIN category c ON b.id = c.business_id

```

462 WHERE b.city NOT LIKE 'Toronto'
463 AND
464 c.category LIKE 'Restaurants'
465 AND
466 b.stars BETWEEN 4.0 AND 5.0)
467 ||'/'||
468 (SELECT COUNT(b.stars) --Counts total # of all reviewed rest. outside Toronto
469 FROM business b INNER JOIN category c ON b.id = c.business_id
470 WHERE b.city NOT LIKE 'Toronto'
471 AND
472 c.category LIKE 'Restaurants'))
473 AS 'Rest. 2-3*/4-5*/All'
474 ,(SELECT SUM(b.review_count) --Counts total # of all rest. reviews outside Toronto
475 FROM business b INNER JOIN category c ON b.id = c.business_id
476 WHERE b.city NOT LIKE 'Toronto'
477 AND
478 c.category LIKE 'Restaurants')
479 AS 'Rest. Total Reviews'
480 FROM business b INNER JOIN category c ON b.id = c.business_id
481 LIMIT 1
482

```

```

483 +-----+-----+-----+-----+
484 | Toronto Rest. 2-3*/4-5*/All | Toronto Rest. Total Reviews | Rest. 2-3*/4-5*/All | Rest. Total Reviews |
485 +-----+-----+-----+-----+
486 | 3/5/10 | 299 | 21/24/61 | 4205 |
487 +-----+-----+-----+-----+

```

492 2. Group businesses based on the ones that are open and the ones that are closed. What differences can you find between the ones that are still open and the ones that are closed? List at least two differences and the SQL code you used to arrive at your answer.

493
494 i. Difference 1:
495 Closed businesses have a slightly lower average star rating than open businesses.

496
497 ii. Difference 2:
498 Open businesses have significantly more total reviews than closed businesses.

500
501 SQL code used for analysis:

```

502  

503 SELECT
504 ((SELECT COUNT(is_open) --Counts # of closed businesses
505 FROM business
506 WHERE is_open = 0)
507 ||' / '||
508 (SELECT AVG(stars) --Counts avg stars of closed businesses
509 FROM business
510 WHERE is_open = 0)
511 ||' / '||
512 (SELECT SUM(review_count) --Counts review total of closed businesses
513 FROM business
514 WHERE is_open = 0))
515 AS 'Closed / Average Stars / Total Reviews'
516 ,((SELECT COUNT(is_open) --Counts # of open businesses
517 FROM business
518 WHERE is_open = 1)
519 ||' / '||
520 (SELECT AVG(stars) --Counts avg stars of open businesses
521 FROM business
522 WHERE is_open = 1)
523 ||' / '||
524 (SELECT SUM(review_count) --Counts review total of open businesses
525 FROM business
526 WHERE is_open = 1))
527 AS 'Open / Average Stars / Total Reviews'
528 FROM business
529 GROUP BY is_open
530 LIMIT 1
531

```

```

532 +-----+-----+-----+-----+
533 | Closed / Average Stars / Total Reviews | Open / Average Stars / Total Reviews |
534 +-----+-----+-----+-----+
535 | 1520 / 3.52039473684211 / 35261 | 8480 / 3.67900943396226 / 269300 |
536 +-----+-----+-----+-----+

```

537
538
539

540

541 3. For this last part of your analysis, you are going to choose the type of analysis you want to conduct on the Yelp dataset and are going to prepare the data for analysis. Ideas for analysis include: Parsing out keywords and business attributes for sentiment analysis, clustering businesses to find commonalities or anomalies between them, predicting the overall star rating for a business, predicting the number of fans a user will have, and so on. These are just a few examples to get you started, so feel free to be creative and come up with your own problem you want to solve. Provide answers, in-line, to all of the following:

542

543

544

545 i. Indicate the type of analysis you chose to do:

546 I decided to examine 'Nightlife' businesses and their success and star ratings by state.

547

548

549 ii. Write 1-2 brief paragraphs on the type of data you will need for your analysis and why you chose that data:

550 In order to examine 'Nightlife' businesses across all states I needed:

551 1. Category

552 2. State

553 3. Average star rating

554 4. Total number of reviews

555 5. It's status (open or closed)

556 These data sets allow me to exmaine how many 'Nightlife' businesses were reviewed in each state, what average star rating and total number of reviews each business received, and whether said business is open or closed. By analyzing said data, I should be able to determine:

557

558 1. Which state produces the most reviews of 'Nightlife' businesses

559 2. The average star rating of 'Nightlife' businesses in each state

560 3. The liklihood of a 'Nightlife' business succeeding or failing per state

561

562

563

564 iii. Output of your finished dataset:

565

Category	State	Business	Status	Average Stars	Total Reviews
Nightlife	AZ	Eklectic Pie - Mesa	Closed	4.0	129
Nightlife	AZ	Irish Republic	Closed	3.0	141
Nightlife	AZ	Innovative Vapors	Closed	4.5	11
Nightlife	AZ	Nabers Music, Bar & Eats	Closed	4.0	75
Nightlife	AZ	Gallagher's	Open	3.0	60
Nightlife	AZ	Bootleggers Modern American Smokehouse	Open	4.0	431
Nightlife	EDH	Mood	Closed	2.0	11
Nightlife	NV	Hi Scores - Blue Diamond	Open	3.5	105
Nightlife	OH	TWIIISTED Burgers & Sushi	Open	4.0	94
Nightlife	OH	The Wine Mill	Open	4.5	42
Nightlife	OH	Brubaker's Pub	Open	3.0	5
Nightlife	OH	Cabin Club	Open	4.0	105
Nightlife	ON	Cabin Fever	Open	4.5	26
Nightlife	ON	The Charlotte Room	Closed	3.5	10
Nightlife	ON	The Erin Mills Pump & Patio	Open	3.0	27
Nightlife	ON	The Fox & Fiddle	Open	2.5	35
Nightlife	ON	Halo Brewery	Open	4.0	15
Nightlife	PA	Moondogs Pub	Open	3.5	7
Nightlife	PA	Iron City Grille	Closed	2.0	3
Nightlife	QC	Restaurant Rosalie	Closed	3.0	19

589

590

591

category	State	Open/Closed	Success Rate	Average Stars	Total Reviews
Nightlife	AZ	2/4	33%	3.75	847
Nightlife	EDH	0/1	0%	2.0	11
Nightlife	NV	1/0	100%	3.5	105
Nightlife	OH	4/0	100%	3.875	246
Nightlife	ON	4/1	80%	3.5	113
Nightlife	PA	1/1	50%	2.75	10
Nightlife	QC	0/1	0%	3.0	19

602

603

604

605

606 iv. Provide the SQL code you used to create your final dataset:

607

```
608 SELECT c.category AS 'Category'
609 ,b.state AS 'State'
610 ,b.name AS 'Business'
611 ,CASE
612     WHEN b.is_open = 0
613     THEN 'Closed'
614     WHEN b.is_open = 1
615     THEN 'Open'
```



```

616         END AS 'Status'
617     ,AVG(b.stars) AS 'Average Stars'
618     ,SUM(b.review_count) AS 'Total Reviews'
619 FROM business b INNER JOIN category c ON b.id = c.business_id
620 WHERE c.category LIKE 'Nightlife'
621 GROUP BY b.id
622 ORDER by b.state ASC
623
624
625 SELECT c.category AS 'Category'
626     ,b.state AS 'State'
627     ,(SUM(b.is_open))
628     || '/' ||
629     (COUNT(b.is_open)-SUM(b.is_open))
630     AS 'Open/Closed'
631     ,(SUM(b.is_open)*100/(SELECT COUNT(b.is_open))) || '%'
632     AS 'Success Rate'
633     ,AVG(b.stars) AS 'Average Stars'
634     ,SUM(b.review_count) AS 'Total Reviews'
635 FROM business b INNER JOIN category c ON b.id = c.business_id
636 WHERE c.category LIKE 'Nightlife'
637 GROUP BY b.state
638
639
640
641 FINAL EXAM

```