codecademy

Funnels with Warby Parker

Learn SQL from Scratch: Capstone Project

Zhao Nian

2018.09.06

Contents

1. Get Familiar with Warby Parker

WARBY PARKER

to offer designer eyewear at a revolutionary price, while leading the way for socially conscious businesses

Retail Mode

1. Shop online and complete a 5-question quiz
2. Pick 3 or 5 frames for 5-day free home-try-on
3. Purchase online at any time and get a new pair
4. Return tried frames after 5 days

2. What’s the Quiz Funnel

2.1 A Quick Look at Table survey

To help users find their perfect frame, Warby Parker has a Style Quiz that has the following questions:

1. "What are you looking for?"
2. "What's your fit?"
3. "Which shapes do you like?"
4. "Which colors do you like?"
5. "When was your last eye exam?"

The users' responses are stored in a table called survey.

2.1 A Quick Look at Table survey

Select all columns from the first 10 rows.

- *What columns does the table survey have?*

```
SELECT *
FROM survey
LIMIT 10;
```

Query Result: the table has three columns - **question**, **user_id**, **response**

question	user_id	response
1. What are you looking for?	005e7f99-d48c-4fce-b605-10506c85aaf7	Women's Styles
2. What's your fit?	005e7f99-d48c-4fce-b605-10506c85aaf7	Medium
3. Which shapes do you like?	00a556ed-f13e-4c67-8704-27e3573684cd	Round
4. Which colors do you like?	00a556ed-f13e-4c67-8704-27e3573684cd	Two-Tone
1. What are you looking for?	00a556ed-f13e-4c67-8704-27e3573684cd	I'm not sure. Let's skip it.
2. What's your fit?	00a556ed-f13e-4c67-8704-27e3573684cd	Narrow
5. When was your last eye exam?	00a556ed-f13e-4c67-8704-27e3573684cd	<1 Year
3. Which shapes do you like?	00bf9d63-0999-43a3-9e5b-9c372e6890d2	Square
5. When was your last eye exam?	00bf9d63-0999-43a3-9e5b-9c372e6890d2	<1 Year
2. What's your fit?	00bf9d63-0999-43a3-9e5b-9c372e6890d2	Medium

2.2 Creation of a Quiz Funnel

Users will "give up" at different points in the survey. Let's analyze how many users move from Question 1 to Question 2, etc.

Create a quiz funnel using the `GROUP BY` command.

- *What is the number of responses for each*

```
SELECT question,
COUNT(DISTINCT user_id)
FROM survey
GROUP BY 1
ORDER BY 1;
```

Query Result:

question	COUNT(DISTINCT user_id)
1. What are you looking for?	500
2. What's your fit?	475
3. Which shapes do you like?	380
4. Which colors do you like?	361
5. When was your last eye exam?	270

The number of responses for question 1-5 is **500**, **475**, **380**, **361**and **270** respectively.

2.3 Analysis of Lower-Completion-Rate Questions

Using a spreadsheet program like Excel or Google Sheets, calculate the percentage of users who answer each question.:

- *Which question(s) of the quiz have a lower completion rates?*
- *What do you think is the reason?*

Calculation Result:

question	percent
1. What are you looking for?	100.0%
2. What's your fit?	95.0%
3. Which shapes do you like?	80.0%
4. Which colors do you like?	95.0%
5. When was your last eye exam?	74.8%

As is shown in the calculation result, Question **3** and **5** have lower completion rates, with **80.0%** and **74.8%** respectively.

2.3 Analysis of Lower-Completion-Rate Questions

To find out why Question 3 and 5 have lower completion rates, let's GROUP BY response to see the distribution.

```
SELECT question, response,
COUNT(response) AS 'num_response'
FROM survey
GROUP BY 2
HAVING question LIKE '3%' OR
question LIKE '5%'
ORDER BY 1;
```

Query Result:

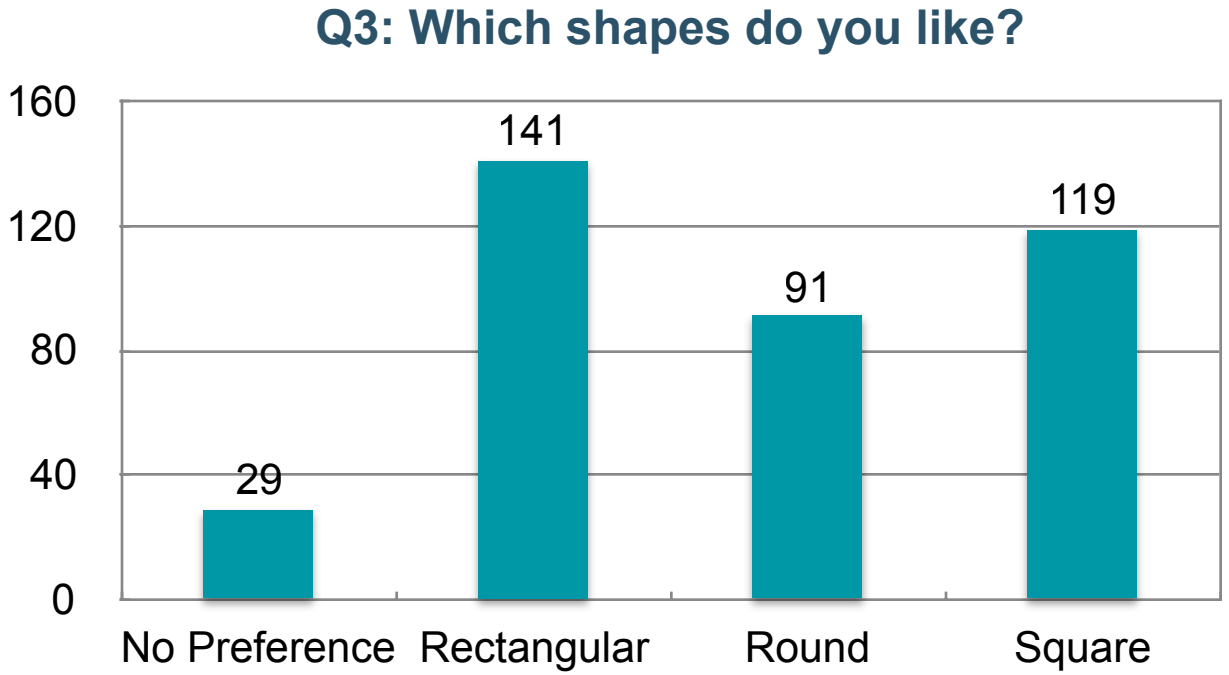
question	response	num_response
3. Which shapes do you like?	No Preference	29
3. Which shapes do you like?	Rectangular	141
3. Which shapes do you like?	Round	91
3. Which shapes do you like?	Square	119
5. When was your last eye exam?	1-3 Years	56
5. When was your last eye exam?	3+ Years	37
5. When was your last eye exam?	<1 Year	141
5. When was your last eye exam?	Not Sure. Let's Skip It	36

2.3.1 Analysis of Lower-Completion-Rate Question: Q3

Probable reason: Customers couldn't find their desired shapes with limited choices.

The choices for question 3 are basically normal frame types, which could hardly cater to fashionable people.

In addition to keep the original types, to include some unique types would get the missed group.



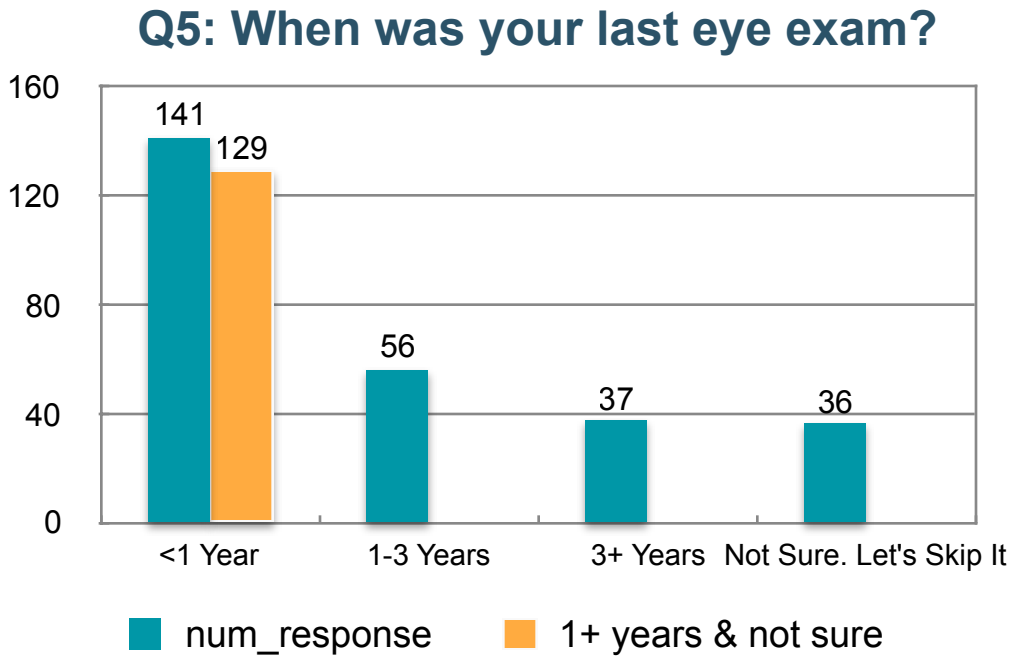
2.3.2 Analysis of Lower-Completion-Rate Question: Q5

Probable reason: Some customers might have never taken eye exam.

Quiz takers who took their last eye exam within 1 year account for the most, with 141 out of 270, even more than the total of the rest 3 choices.

Hence, we can infer that most customers are either frequent eyewear changers or new glasses wearers, with the latter ones more likely. However, not all first-pair-buyers have taken eye exam in eyewear stores or hospitals. Moreover, some customers may not be short-sighters. They can just wear for cool.

Considering the above conditions, it's necessary to add one choice "never taken".



3. A/B Testing with Home-Try-On Funnel

3.1 A Quick Look at Table `quiz`, `home_try_on` and `purchase`

Warby Parker's purchase funnel is:

Take the Style Quiz → Home Try-On → Purchase the Perfect Pair of Glasses

During the Home Try-On stage, we will be conducting an A/B Test:

1. 50% of the users will get 3 pairs to try on
2. 50% of the users will get 5 pairs to try on

Let's find out whether or not users who get more pairs to try on at home will be more likely to make a purchase.

The data will be distributed across three tables: `quiz`, `home_try_on`, `purchase`.

3.1.1 A Quick Look at Table quiz

Examine the first five rows of each table

- *What are the column names?*

```
SELECT *
FROM quiz
LIMIT 5;
```

Query Result: table quiz has five columns - **user_id**, **style, fit, shape** and **color**

Table quiz

user_id	style	fit	shape	color
4e8118dc-bb3d-49bf-85fc-cca8d83232ac	Women's Styles	Medium	Rectangular	Tortoise
291f1cca-e507-48be-b063-002b14906468	Women's Styles	Narrow	Round	Black
75122300-0736-4087-b6d8-c0c5373a1a04	Women's Styles	Wide	Rectangular	Two-Tone
75bc6ebd-40cd-4e1d-a301-27ddd93b12e2	Women's Styles	Narrow	Square	Two-Tone
ce965c4d-7a2b-4db6-9847-601747fa7812	Women's Styles	Wide	Rectangular	Black

3.1.2 A Quick Look at Table home_try_on

Examine the first five rows of each table

- *What are the column names?*

```
SELECT *
FROM home_try_on
LIMIT 5;
```

Query Result:

table home_try_on has three columns - **user_id**, **number_of_pairs** and **address**

Table home_try_on

user_id	number_of_pairs	address
d8addd87-3217-4429-9a01-d56d68111da7	5 pairs	145 New York 9a
f52b07c8-abe4-4f4a-9d39-ba9fc9a184cc	5 pairs	383 Madison Ave
8ba0d2d5-1a31-403e-9fa5-79540f8477f9	5 pairs	287 Pell St
4e71850e-8bbf-4e6b-accc-49a7bb46c586	3 pairs	347 Madison Square N
3bc8f97f-2336-4dab-bd86-e391609dab97	5 pairs	182 Cornelia St

3.1.3 A Quick Look at Table purchase

Examine the first five rows of each table

- *What are the column names?*

```
SELECT *
FROM purchase
LIMIT 5;
```

Query Result:

table purchase has six columns - **user_id**, **product_id**, **style**, **model_name**, **color** and **price**

Table purchase

user_id	product_id	style	model_name	color	price
00a9dd17-36c8-430c-9d76-df49d4197dcf	8	Women's Styles	Lucy	Jet Black	150
00e15fe0-c86f-4818-9c63-3422211baa97	7	Women's Styles	Lucy	Elderflower Crystal	150
017506f7-aba1-4b9d-8b7b-f4426e71b8ca	4	Men's Styles	Dawes	Jet Black	150
0176bfb3-9c51-4b1c-b593-87edab3c54cb	10	Women's Styles	Eugene Narrow	Rosewood Tortoise	95
01fdf106-f73c-4d3f-a036-2f3e2ab1ce06	8	Women's Styles	Lucy	Jet Black	150

3.2 Creation of a Home-Try-On Funnel

We'd like to create a new table with the following layout:

user_id	is_home_try_on	number_of_pairs	is_purchase
4e8118dc	TRUE	3	FALSE
291f1cca	TRUE	5	FALSE
75122300	FALSE	NULL	FALSE

Each row will represent a single user from the browse table:

1. If the user has any entries in `home_try_on`, then `is_home_try_on` will be ‘True'.
2. `number_of_pairs` comes from `home_try_on` table
3. If the user has any entries in `is_purchase`, then `is_purchase` will be 'True'.

3.2 Creation of a Home-Try-On Funnel

Use a LEFT JOIN to combine the three tables, starting with the top of the funnel (browse) and ending with the bottom of the funnel (purchase).

Select only the first 10 rows from this table (otherwise, the query will run really slowly)

```
WITH funnels AS
(
 SELECT DISTINCT
   q.user_id,
   h.user_id IS NOT NULL AS
'is_home_try_on',
   h.number_of_pairs,
   p.user_id IS NOT NULL AS
'is_purchase'
 FROM quiz AS 'q'
 LEFT JOIN home_try_on AS 'h'
 ON q.user_id = h.user_id
 LEFT JOIN purchase AS 'p'
 ON q.user_id = p.user_id
)

SELECT *
FROM funnels
LIMIT 10;
```

3.2 Creation of a Home-Try-On Funnel

Query Result:

user_id	is_home_try_on	number_of_pairs	is_purchase
4e8118dc-bb3d-49bf-85fc-cca8d83232ac	1	3 pairs	0
291f1cca-e507-48be-b063-002b14906468	1	3 pairs	1
75122300-0736-4087-b6d8-c0c5373a1a04	0		0
75bc6ebd-40cd-4e1d-a301-27ddd93b12e2	1	5 pairs	0
ce965c4d-7a2b-4db6-9847-601747fa7812	1	3 pairs	1
28867d12-27a6-4e6a-a5fb-8bb5440117ae	1	5 pairs	1
5a7a7e13-fbcf-46e4-9093-79799649d6c5	0		0
0143cb8b-bb81-4916-9750-ce956c9f9bd9	0		0
a4ccc1b3-cbb6-449c-b7a5-03af42c97433	1	5 pairs	0
b1dded76-cd60-4222-82cb-f6d464104298	1	3 pairs	0

3.3 Analysis of Home-Try-On Funnel

Once we have the data in this format, we can analyze it in several ways:

1. We can calculate overall conversion rates by aggregating across all rows.
2. We can compare conversion from `quiz`→`home_try_on` and `home_try_on`→`purchase`.
3. We can calculate the difference in purchase rates between customers who had 3 `number_of_pairs` with ones who had 5.

3.3 Analysis of Home-Try-On Funnel

Aggregate across all rows to get the number of users reaching each step and conversion rates between two steps.

```
SELECT COUNT(*) AS 'num_quiz',
  SUM(is_home_try_on) AS
'num_home_try_on',
  SUM(is_purchase) AS
'num_purchase',
  ROUND(1.0 * SUM(is_home_try_on)/
COUNT(user_id),2) AS
'quiz_to_try_on',
  ROUND(1.0 * SUM(is_purchase)/
SUM(is_home_try_on),2) AS
'try_on_to_purchase'
FROM funnels;
```

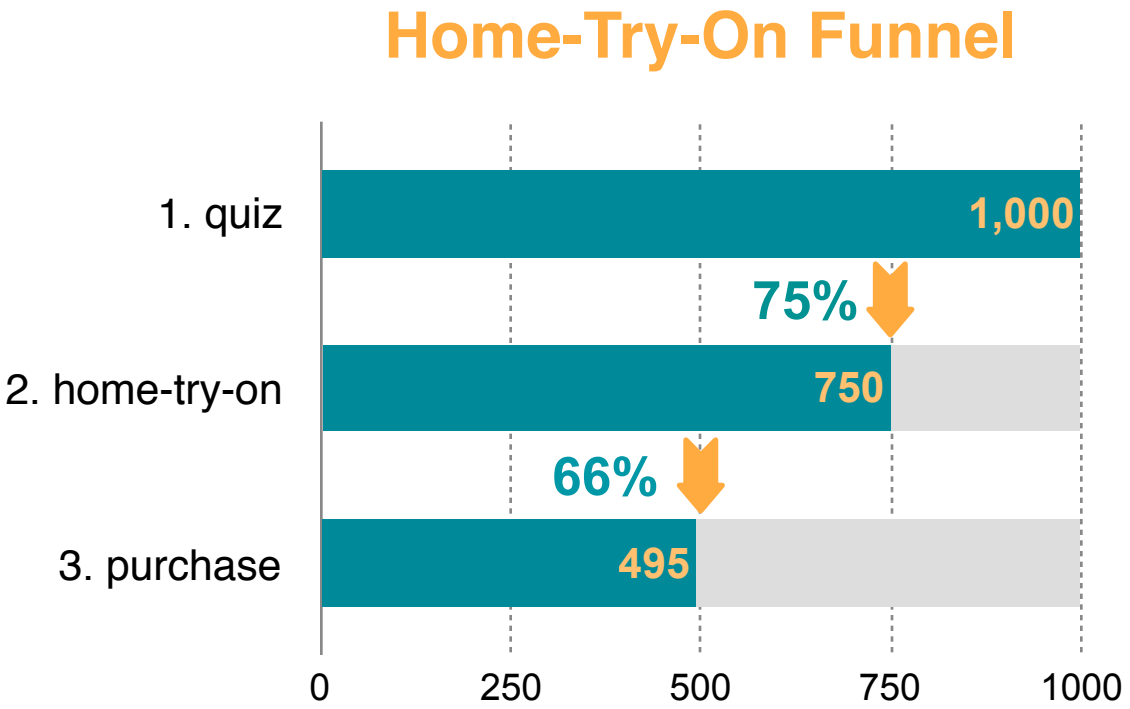
Query Result:

num_quiz	num_home_try_on	num_purchase	quiz_to_try_on	try_on_to_purchase
1000	750	495	0.75	0.66

3.3.1 Overall and Step-by-Step Conversion Rates

The overall purchase rate is 49.5%. Through the home-try-on funnel, users drop most from step 2 to step 3, with conversion rate being 66%.

To raise the conversion rate of home-try-on to purchase, we should find out what stops users from moving on to the next step.



3.3.2 A/B Testing with Home-Try-On Pairs

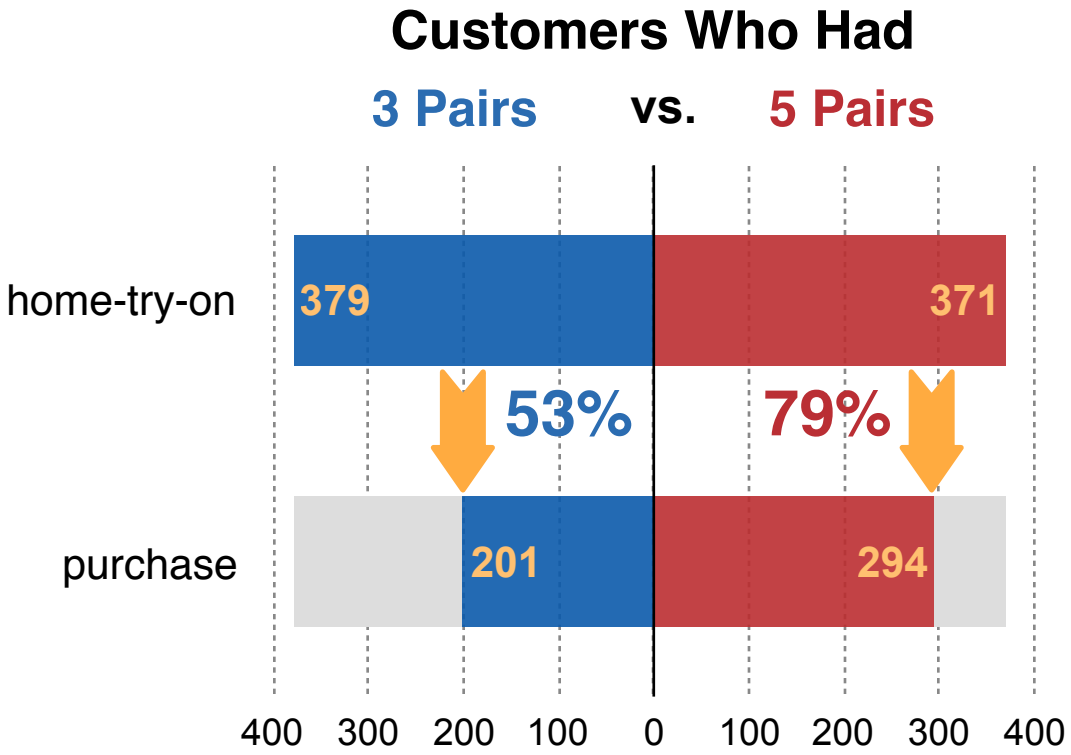
Some of customers receive 3 pairs, while the others get 5. Let's GROUP BY number_of_pairs to see the difference of conversion rate between two groups.

```
SELECT number_of_pairs, COUNT(*)
AS 'num_quiz',
  SUM(is_home_try_on) AS
'num_home_try_on',
  SUM(is_purchase) AS
'num_purchase',
  ROUND(1.0 * SUM(is_purchase)/
SUM(is_home_try_on),2) AS
'try_on_to_purchase'
FROM funnels
GROUP BY 1
ORDER BY 1;
```

Query Result:

number_of_pairs	num_quiz	num_home_try_on	num_purchase	try_on_to_purchase
	250	0	0	
3 pairs	379	379	201	0.53
5 pairs	371	371	294	0.79

3.3.2 A/B Testing with Home-Try-On Pairs



According to the A/B test, 79% of customers who had tried 5 pairs made order at last, more likely to buy than those who had 3 pairs.

With more options, people have greater chances to find the fittest. Thus, to elevate purchase rate, users should be asked to take 5 frames for home-try-on.

4. More Insights from Purchase Table

4.1 Best Selling Products

To find the most common types and relevant sales of sold products. Aggregate across all rows in purchase and GROUP BY product_id.

```
SELECT product_id ,style,
model_name, price, color,
SUM(price) AS 'sales', COUNT(*) AS
'num_purchase'
FROM purchase
GROUP BY 1
ORDER BY 7 DESC;
```

Query Result:

product_id	style	model_name	price	color	sales	num_purchase
3	Men's Styles	Dawes	150	Driftwood Fade	9450	63
10	Women's Styles	Eugene Narrow	95	Rosewood Tortoise	5890	62
9	Women's Styles	Eugene Narrow	95	Rose Crystal	5130	54
1	Men's Styles	Brady	95	Layered Tortoise Matte	4940	52
6	Women's Styles	Olive	95	Pearled Tortoise	4750	50
4	Men's Styles	Dawes	150	Jet Black	6600	44
7	Women's Styles	Lucy	150	Elderflower Crystal	6600	44
2	Men's Styles	Brady	95	Sea Glass Gray	4085	43
8	Women's Styles	Lucy	150	Jet Black	6300	42
5	Men's Styles	Monocle	50	Endangered Tortoise	2050	41

4.1 Best Selling Products

Dawes
in
Driftwood Fade

Eugene Narrow
in
Rosewood Tortoise

Eugene Narrow
in
Rose Crystal

Warby Parker's top 3 best selling types are Dawes in Driftwood Fade, Eugene Narrow in Rosewood Tortoise and Eugene Narrow in Rose Crystal. As these types are generally well-received. We can put their images on Warby Parker's homepage and digital channel ads to attract more visitors.

Dawes in Driftwood Fade contributes most to Warby Parker's sales, with 9450 in revenue. Hence, in next marketing campaign, resources should be distributed most to this product to maintain current awareness and keep its leading position.

4.2 Product with Bad Performance

Monocle in Endangered Tortoise was sold least in quantity and revenue. Since this type is neither popular nor lucrative, it's better to remove this product when the stock is sold out. While the relevant marketing and manufacturing budget could be redistributed to develop new product.

product_id	style	model_name	price	color	sales	num_purchase
3	Men's Styles	Dawes	150	Driftwood Fade	9450	63
10	Women's Styles	Eugene Narrow	95	Rosewood Tortoise	5890	62
9	Women's Styles	Eugene Narrow	95	Rose Crystal	5130	54
1	Men's Styles	Brady	95	Layered Tortoise Matte	4940	52
6	Women's Styles	Olive	95	Pearled Tortoise	4750	50
4	Men's Styles	Dawes	150	Jet Black	6600	44
7	Women's Styles	Lucy	150	Elderflower Crystal	6600	44
2	Men's Styles	Brady	95	Sea Glass Gray	4085	43
8	Women's Styles	Lucy	150	Jet Black	6300	42
5	Men's Styles	Monocle	50	Endangered Tortoise	2050	41

THANKS!