Appendix

1.1. Empty stations

```
SELECT
 (
 SELECT
  COUNT(id)
 FROM
  `bigquery-public-data.london_bicycles.cycle_stations`
 WHERE
  bikes_count = 0 AND removal_date is null) AS empty,
 (
 SELECT
  COUNT(id)
 FROM
  `bigquery-public-data.london_bicycles.cycle_stations`
 WHERE
  bikes_count != 0 AND removal_date is null) AS at_capacity,
 (
 SELECT
  COUNT(id)
 FROM
  `bigquery-public-data.london_bicycles.cycle_stations`
 WHERE
  removal_date is not null) AS out_of_service,
 COUNT(id) AS total_station
FROM
 `bigquery-public-data.london_bicycles.cycle_stations` as station
LIMIT
 1000;
```

empty	at_capacity	out_of_service	total_station
11	765	2	778

1.2. Empty stations details

```
SELECT
 id,
 name,
 bikes_count,
 nbEmptyDocks,
 docks_count,
FROM
 `bigquery-public-data.london_bicycles.cycle_stations`
WHERE nbEmptyDocks = docks_count
LIMIT
 1000;
```

id	name	bikes_count	nbEmptyDocks	docks_count
384	Marloes Road, Kensington	0	15	15
186	South Wharf Road, Paddington	0	16	16
528	Clarges Street, Mayfair	0	16	16
224	Queensway, Kensington Gardens	0	17	17

6	<mark>Broadcasting House, Marylebone</mark>	0	18	18
373	<mark>Prince Consort Road, Knightsbridge</mark>	0	18	18
383	Frith Street, Soho	0	18	18
106	Woodstock Street, Mayfair	0	21	21
836	York Way, Kings Cross	0	24	24
88	<mark>Bayley Street , Bloomsbury</mark>	0	25	25
526	Lancaster Drive, Blackwall	0	27	27

2.1. Popular stations by usage peak days and hours

```
SELECT
  COUNT(rental_id) AS trips,
  start_station_name,
  ROUND(AVG(duration)/60,1) as avg_minutes,
  EXTRACT(DAYOFWEEK
  FROM
    start_date) AS the_day,
  EXTRACT(HOUR
  FROM
    start_date) AS the_hour
FROM
  `bigquery-public-data.london_bicycles.cycle_hire` AS hire
GROUP BY
  start_station_name,
  the_day,
  the_hour
ORDER BY
  trips DESC
LIMIT
  1000;
```

trips	start_station_name	avg_minutes	the_day	the_hour
17783	Belgrove Street , King's Cross	13.9	3	8
16932	Belgrove Street , King's Cross	13.5	4	8
16665	Belgrove Street , King's Cross	13.8	5	8
15846	Waterloo Station 3, Waterloo	12.9	3	7
15799	Belgrove Street , King's Cross	13.6	2	8
15302	Waterloo Station 3, Waterloo	13.6	5	7
15045	Waterloo Station 3, Waterloo	13.7	4	8
15013	Waterloo Station 3, Waterloo	12.9	4	7
14883	Waterloo Station 3, Waterloo	13.7	3	8
14669	Waterloo Station 3, Waterloo	13.1	6	8
14188	Waterloo Station 3, Waterloo	13.0	2	7
13882	Belgrove Street , King's Cross	13.1	6	8
13763	Waterloo Station 3, Waterloo	14.0	5	8

| 13372 | Waterloo Station 3, Waterloo | 12.8 | 6 | 7 |
| 12168 | Waterloo Station 3, Waterloo | 13.6 | 2 | 8 |

2.2. Popular trips by trip types

```
SELECT
 COUNT(rental_id) AS trips,
 start_station_name,
 end_station_name,
 ROUND(AVG(duration)/60,1) AS avg_minutes,
 CASE
  WHEN ROUND(AVG(duration)/60,1) >= 30 THEN "workout"
  WHEN ROUND(AVG(duration)/60,1) >= 7 THEN "commute"
  WHEN ROUND(AVG(duration)/60,1) <7 THEN "quick ride"
END
 AS trip_type/*,
 EXTRACT(DAYOFWEEK
 FROM
  start_date) AS the_day,
 EXTRACT(HOUR
 FROM
  start_date) AS the_hour*/
FROM
 `bigquery-public-data.london_bicycles.cycle_hire` AS hire
GROUP BY
 start_station_name,
 end_station_name/*,
 the_day,
 the_hour */
ORDER BY
 trips DESC
LIMIT
 1000;
```

trips	start_station_name	end_station_name	avg_minutes	trip_type
58875	Hyde Park Corner, Hyde Park	Hyde Park Corner, Hyde Park	56.0	workout
32289	Black Lion Gate, Kensington Gardens	Black Lion Gate, Kensington Gardens	54.0	workout
31744	Albert Gate, Hyde Park	Albert Gate, Hyde Park	47.8	workout
24258	Aquatic Centre, Queen Elizabeth Olympic Park	Aquatic Centre, Queen Elizabeth Olympic Park	58.6	workout
21636	Triangle Car Park, Hyde Park	Triangle Car Park, Hyde Park	49.6	workout
15419	Speakers' Corner 1, Hyde Park	Speakers' Corner 1, Hyde Park	60.1	workout
15084	Palace Gate, Kensington Gardens	Palace Gate, Kensington Gardens	48.5	workout
14232	Speakers' Corner 2, Hyde Park	Speakers' Corner 2, Hyde Park	56.9	workout
12701	Park Lane, Hyde Park	Park Lane , Hyde Park	58.7	workout
12105	Black Lion Gate, Kensington Gardens	Hyde Park Corner, Hyde Park	33.7	workout
12066	Wellington Arch, Hyde Park	Wellington Arch, Hyde Park	48.6	workout
11940	Black Lion Gate, Kensington Gardens	Palace Gate, Kensington Gardens	26.2	commute
11856	Hyde Park Corner, Hyde Park	Albert Gate, Hyde Park	44.5	workout
11090	Hyde Park Corner, Hyde Park	Triangle Car Park, Hyde Park	30.5	workout

10732	Hyde Park Corner, Hyde Park	Black Lion Gate, Kensington Gardens	38.6	workout

2.3. Popular trips by peak days and hours

```
SELECT
 COUNT(rental_id) AS trips,
 start_station_name,
 end_station_name,
 ROUND(AVG(duration)/60,1) as avg_minutes,
 EXTRACT(DAYOFWEEK
 FROM
   start_date) AS the_day,
 EXTRACT(HOUR
 FROM
   start_date) AS the_hour
FROM
 `bigquery-public-data.london_bicycles.cycle_hire` AS hire
GROUP BY
 start_station_name,
 end_station_name,
 the_day,
 the_hour
ORDER BY
 trips DESC
LIMIT
 1000;
```

trips	start_station_name	end_station_name	avg_minutes	the_day	the_hour
2080	Hyde Park Corner, Hyde Park	Hyde Park Corner, Hyde Park	59.3	1	15
1976	Hyde Park Corner, Hyde Park	Hyde Park Corner, Hyde Park	57.1	1	16
1785	Hyde Park Corner, Hyde Park	Hyde Park Corner, Hyde Park	62.4	1	14
1728	Hyde Park Corner, Hyde Park	Hyde Park Corner, Hyde Park	54.7	7	16
1675	Hyde Park Corner, Hyde Park	Hyde Park Corner, Hyde Park	61.9	1	13
1646	Hyde Park Corner, Hyde Park	Hyde Park Corner, Hyde Park	56.5	7	15
1455	Hyde Park Corner, Hyde Park	Hyde Park Corner, Hyde Park	54.0	1	17
1397	Hyde Park Corner, Hyde Park	Hyde Park Corner, Hyde Park	53.2	7	17
1374	Hyde Park Corner, Hyde Park	Hyde Park Corner, Hyde Park	59.4	7	14
1239	Hyde Park Corner, Hyde Park	Hyde Park Corner, Hyde Park	58.7	1	12
1234	Hyde Park Corner, Hyde Park	Hyde Park Corner, Hyde Park	49.1	1	18
1107	Hyde Park Corner, Hyde Park	Hyde Park Corner, Hyde Park	63.7	7	13
1052	Black Lion Gate, Kensington Gardens	Black Lion Gate, Kensington Gardens	56.0	1	16
1040	Hyde Park Corner, Hyde Park	Hyde Park Corner, Hyde Park	60.7	1	11
1029	Black Lion Gate, Kensington Gardens	Black Lion Gate, Kensington Gardens	61.1	1	15

3.1. Empty stations by trip types

```sql
SELECT
  COUNT(rental_id) AS trips,
  start_station_name,
  end_station_name,
  bikes_count,
  ROUND(AVG(duration)/60,1) AS avg_minutes,
  CASE
    WHEN ROUND(AVG(duration)/60,1) >= 30 THEN "workout"
    WHEN ROUND(AVG(duration)/60,1) >= 7 THEN "commute"
    WHEN ROUND(AVG(duration)/60,1) <7 THEN "quick ride"
END
  AS trip_type/*,
  EXTRACT(DAYOFWEEK
  FROM
    start_date) AS the_day,
  EXTRACT(HOUR
  FROM
    start_date) AS the_hour*/
FROM
  `bigquery-public-data.london_bicycles.cycle_hire` AS hire
JOIN `bigquery-public-data.london_bicycles.cycle_stations` as station
ON station.id=hire.start_station_id
WHERE nbEmptyDocks = docks_count
GROUP BY
  start_station_name,
  end_station_name,
  bikes_count/*,
  the_day,
  the_hour */
ORDER BY
  trips DESC
LIMIT
  1000;
```

trips	start_station_name	end_station_name	bikes_count	avg_minutes	trip_type
3103	Bayley Street , Bloomsbury	Belgrove Street , King's Cross	0	9.9	commute
2655	Drury Lane, Covent Garden	Belgrove Street , King's Cross	0	12.0	commute
1915	Prince Consort Road, Knightsbridge	South Kensington Station, South Kensington	0	4.9	quick ride
1720	Drury Lane, Covent Garden	Waterloo Station 3, Waterloo	0	7.4	commute
1554	Lancaster Drive, Blackwall	Montgomery Square, Canary Wharf	0	6.6	quick ride
1440	Broadcasting House, Marylebone	Belgrove Street , King's Cross	0	14.2	commute
1414	Drury Lane, Covent Garden	Waterloo Station 1, Waterloo	0	8.1	commute
1193	Bayley Street , Bloomsbury	Russell Square Station, Bloomsbury	0	7.8	commute
1130	Whiteley's, Bayswater	Whiteley's, Bayswater	0	69.2	workout
1118	Whiteley's, Bayswater	Devonshire Terrace, Bayswater	0	13.4	commute
1007	Grove End Road, St. John's Wood	Rossmore Road, Marylebone	0	5.8	quick ride
933	Drury Lane, Covent Garden	Finsbury Circus, Liverpool Street	0	12.8	commute
857	Whiteley's, Bayswater	All Saints Church, Portobello	0	11.1	commute

839	Grove End Road, St. John's Wood	Grove End Road, St. John's Wood	0	74.3	workout
814	Drury Lane, Covent Garden	Endsleigh Gardens, Euston	0	9.4	commute

3.2. Empty stations by trip types, peak days and hours

```
SELECT
 COUNT(rental_id) AS trips,
 start_station_name,
 end_station_name,
 bikes_count,
 ROUND(AVG(duration)/60,1) AS avg_minutes,
 CASE
  WHEN ROUND(AVG(duration)/60,1) >= 30 THEN "workout"
  WHEN ROUND(AVG(duration)/60,1) >= 7 THEN "commute"
  WHEN ROUND(AVG(duration)/60,1) <7 THEN "quick ride"
END
 AS trip_type,
 EXTRACT(DAYOFWEEK
 FROM
  start_date) AS the_day,
 EXTRACT(HOUR
 FROM
  start_date) AS the_hour
FROM
 `bigquery-public-data.london_bicycles.cycle_hire` AS hire
JOIN `bigquery-public-data.london_bicycles.cycle_stations` as station
ON station.id=hire.start_station_id
WHERE nbEmptyDocks = docks_count
GROUP BY
 start_station_name,
 end_station_name,
 bikes_count,
 the_day,
 the_hour
ORDER BY
 trips DESC
LIMIT
 1000;
```

trips	start_station_name	end_station_name	bikes_count	avg_minutes	trip_type	the_day	the_hour
359	Bayley Street , Bloomsbury	Belgrove Street , King's Cross	0	7.8	commute	3	17
357	Bayley Street , Bloomsbury	Belgrove Street , King's Cross	0	10.2	commute	2	17
351	Bayley Street , Bloomsbury	Belgrove Street , King's Cross	0	8.1	commute	4	17
301	Bayley Street , Bloomsbury	Belgrove Street , King's Cross	0	7.9	commute	5	17
264	Bayley Street , Bloomsbury	Belgrove Street , King's Cross	0	8.0	commute	6	17
209	Drury Lane, Covent Garden	Belgrove Street , King's Cross	0	10.8	commute	4	17
187	Drury Lane, Covent Garden	Belgrove Street , King's Cross	0	11.0	commute	6	17

187	Drury Lane, Covent Garden	Belgrove Street , King's Cross	0	10.6	commute	2	17
174	Drury Lane, Covent Garden	Belgrove Street , King's Cross	0	10.3	commute	3	17
163	Drury Lane, Covent Garden	Belgrove Street , King's Cross	0	16.3	commute	5	17
145	Drury Lane, Covent Garden	Belgrove Street , King's Cross	0	10.6	commute	5	16
126	Drury Lane, Covent Garden	Belgrove Street , King's Cross	0	10.0	commute	4	16
114	Drury Lane, Covent Garden	Belgrove Street , King's Cross	0	10.3	commute	6	16
114	Drury Lane, Covent Garden	Finsbury Circus, Liverpool Street	0	11.3	commute	5	17
112	Drury Lane, Covent Garden	Belgrove Street , King's Cross	0	10.2	commute	3	16