Driver Analysis

Analyzing lap times, podiums, wins, championships, career length, and races to determine best drivers.

```
import pandas as pd

import seaborn as sns

sns.set_palette('bright')
```

Reading DataFrames

```
driver = pd.read_pickle("driver.plk")
driver
```

```
                         id                    name first_name  \
0              adderly-fong            Adderly Fong    Adderly
1              adolf-brudes            Adolf Brudes      Adolf
2      adolfo-schwelm-cruz    Adolfo Schwelm Cruz     Adolfo
3             adrian-campos           Adrián Campos     Adrián
4              adrian-sutil            Adrian Sutil     Adrian
..                      ...                     ...        ...
907               yuji-ide              Yuji Ide       Yuji
908            yuki-tsunoda            Yuki Tsunoda       Yuki
909  yves-giraud-cabantous  Yves Giraud-Cabantous       Yves
910           zak-osullivan         Zak O'Sullivan        Zak
911      zsolt-baumgartner      Zsolt Baumgartner      Zsolt

             last_name                                full_name
abbreviation  \
0                 Fong                  Adderly Fong Cheun-yue
FON
1               Brudes                Adolf Brudes von Breslau
BRU
2        Schwelm Cruz       Adolfo Julio Carlos Schwelm Cruz
SCH
3               Campos                    Adrián Campos Suñer
CAM
4                Sutil                           Adrian Sutil
SUT
..                 ...                                    ...
...
907                Ide                           Yuji Ide
IDE
908            Tsunoda                           Yuki Tsunoda
TSU
```

```
909  Giraud-Cabantous  Marius Aristide Yves Giraud-Cabantous
CAB
910         O'Sullivan                          Zak O'Sullivan
OSU
911        Baumgartner                       Zsolt Baumgartner
BAU

    permanent_number gender date_of_birth date_of_death  ...  \
0               None   MALE    1990-03-02          None  ...
1               None   MALE    1899-10-15    1986-11-05  ...
2               None   MALE    1923-06-28    2012-02-10  ...
3               None   MALE    1960-06-17    2021-01-27  ...
4               None   MALE    1983-01-11          None  ...
..               ...    ...           ...           ...  ...
907             None   MALE    1975-01-21          None  ...
908               22   MALE    2000-05-11          None  ...
909             None   MALE    1904-10-08    1973-03-30  ...
910             None   MALE    2005-02-06          None  ...
911             None   MALE    1981-01-01          None  ...

    total_race_starts total_race_wins total_race_laps total_podiums  \
0                   0               0               0             0
1                   1               0               5             0
2                   1               0              20             0
3                  17               0             433             0
4                 128               0            6022             0
..                ...             ...             ...           ...
907                 4               0             145             0
908               105               0            5653             0
909                13               0             522             0
910                 0               0               0             0
911                20               0             959             0

     total_points  total_championship_points  total_pole_positions  \
0             0.0                        0.0                     0
1             0.0                        0.0                     0
2             0.0                        0.0                     0
3             0.0                        0.0                     0
4           124.0                      124.0                     0
..            ...                        ...                   ...
907           0.0                        0.0                     0
908         111.0                      111.0                     0
909           5.0                        5.0                     0
910           0.0                        0.0                     0
911           1.0                        1.0                     0

     total_fastest_laps  total_driver_of_the_day  total_grand_slams
0                     0                        0                  0
1                     0                        0                  0
2                     0                        0                  0
```

```
3                     0                          0                   0
4                     1                          0                   0
..                  ...                        ...                 ...
907                   0                          0                   0
908                   1                          2                   0
909                   0                          0                   0
910                   0                          0                   0
911                   0                          0                   0

[912 rows x 29 columns]
```

```
driver_by_season = pd.read_pickle("season_driver.plk")
driver_by_season
```

```
      year           driver_id  position_number position_text  \
0     1950  juan-manuel-fangio              2.0             2
1     1950       luigi-fagioli              3.0             3
2     1950         nino-farina              1.0             1
3     1950         reg-parnell              9.0             9
4     1950     consalvo-sanesi              NaN          None
...    ...                 ...              ...           ...
3374  2025      lewis-hamilton              6.0             6
3375  2025      dino-beganovic              NaN          None
3376  2025   gabriel-bortoleto             18.0            18
3377  2025     nico-hulkenberg             10.0            10
3378  2025        isack-hadjar              9.0             9

      best_starting_grid_position  best_race_result
total_race_entries  \
0                             1.0               1.0
6
1                             2.0               2.0
6
2                             1.0               1.0
6
3                             4.0               3.0
2
4                             4.0               NaN
1
...                           ...               ...                 ..
.
3374                          4.0               4.0
18
3375                          NaN               NaN
0
3376                          7.0               6.0
18
3377                         11.0               3.0
18
3378                          4.0               3.0
```

```
18

      total_race_starts  total_race_wins  total_race_laps
total_podiums  \
0                     6                3              317
3
1                     6                0              291
5
2                     6                3              282
3
3                     2                0               80
1
4                     1                0               11
0
...                 ...              ...              ...              .
..
3374                 18                0             1030
0
3375                  0                0                0
0
3376                 18                0              986
0
3377                 17                0              963
1
3378                 18                0              983
1

      total_points  total_pole_positions  total_fastest_laps  \
0             27.0                     4                   3
1             28.0                     0                   0
2             30.0                     2                   3
3              4.0                     0                   0
4              0.0                     0                   0
...            ...                   ...                 ...
3374         125.0                     0                   1
3375           0.0                     0                   0
3376          18.0                     0                   0
3377          37.0                     0                   0
3378          39.0                     0                   0

      total_driver_of_the_day  total_grand_slams
0                           0                  0
1                           0                  0
2                           0                  0
3                           0                  0
4                           0                  0
...                       ...                ...
3374                        2                  0
3375                        0                  0
3376                        2                  0
```

```
3377                         1                  0
3378                         1                  0

[3379 rows x 16 columns]
```

```
race_data = pd.read_pickle("race_data.plk")
race_data
```

```
        race_id                         type  position_display_order  \
0           290     PRE_QUALIFYING_RESULT                       1
1           290     PRE_QUALIFYING_RESULT                       2
2           290     PRE_QUALIFYING_RESULT                       3
3           290     PRE_QUALIFYING_RESULT                       4
4           290     PRE_QUALIFYING_RESULT                       5
...         ...                       ...                     ...
183627     1143  DRIVER_OF_THE_DAY_RESULT                       1
183628     1143  DRIVER_OF_THE_DAY_RESULT                       2
183629     1143  DRIVER_OF_THE_DAY_RESULT                       3
183630     1143  DRIVER_OF_THE_DAY_RESULT                       4
183631     1143  DRIVER_OF_THE_DAY_RESULT                       5

        position_number position_text driver_number
driver_id  \
0                   1.0             1            40   gilles-
villeneuve
1                   2.0             2            23      patrick-
tambay
2                   3.0             3            34  jean-pierre-
jarier
3                   4.0             4            30        brett-
lunger
4                   5.0             5            38        brian-
henton
...                 ...           ...           ...                  ..
.
183627              1.0             1            14     fernando-
alonso
183628              2.0             2            63      george-
russell
183629              3.0             3             1      max-
verstappen
183630              4.0             4             4        lando-
norris
183631              5.0             5            44      lewis-
hamilton

       constructor_id engine_manufacturer_id tyre_manufacturer_id  ...
\
0             mclaren                   ford             goodyear  ...
```

```
1              ensign                   ford             goodyear  ...
2              penske                   ford             goodyear  ...
3             mclaren                   ford             goodyear  ...
4               march                   ford             goodyear  ...
...               ...                    ...                  ...  ...
183627   aston-martin               mercedes              pirelli  ...
183628       mercedes               mercedes              pirelli  ...
183629       red-bull             honda-rbpt              pirelli  ...
183630        mclaren               mercedes              pirelli  ...
183631        ferrari                ferrari              pirelli  ...

       fastest_lap_time_millis  fastest_lap_gap fastest_lap_gap_millis
\
0                          NaN             None                    NaN
1                          NaN             None                    NaN
2                          NaN             None                    NaN
3                          NaN             None                    NaN
4                          NaN             None                    NaN
...                        ...              ...                    ...
183627                     NaN             None                    NaN
183628                     NaN             None                    NaN
183629                     NaN             None                    NaN
183630                     NaN             None                    NaN
183631                     NaN             None                    NaN

        fastest_lap_interval fastest_lap_interval_millis
pit_stop_stop  \
0                       None                         NaN
NaN
1                       None                         NaN
```

```
NaN
2                         None                            NaN
NaN
3                         None                            NaN
NaN
4                         None                            NaN
NaN
...                        ...                            ...              ..
.
183627                    None                            NaN
NaN
183628                    None                            NaN
NaN
183629                    None                            NaN
NaN
183630                    None                            NaN
NaN
183631                    None                            NaN
NaN

        pit_stop_lap pit_stop_time  pit_stop_time_millis  \
0                NaN          None                   NaN
1                NaN          None                   NaN
2                NaN          None                   NaN
3                NaN          None                   NaN
4                NaN          None                   NaN
...              ...           ...                   ...
183627           NaN          None                   NaN
183628           NaN          None                   NaN
183629           NaN          None                   NaN
183630           NaN          None                   NaN
183631           NaN          None                   NaN

       driver_of_the_day_percentage
0                               NaN
1                               NaN
2                               NaN
3                               NaN
4                               NaN
...                              ...
183627                         22.5
183628                         16.4
183629                         14.5
183630                          8.7
183631                          7.6

[183632 rows x 71 columns]
```

Cleaning DataFrames

driver DataFrame

```
driver.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 912 entries, 0 to 911
Data columns (total 29 columns):
 #   Column                          Non-Null Count  Dtype  
---  ------                          --------------  -----  
 0   id                              912 non-null    object 
 1   name                            912 non-null    object 
 2   first_name                      912 non-null    object 
 3   last_name                       912 non-null    object 
 4   full_name                       912 non-null    object 
 5   abbreviation                    912 non-null    object 
 6   permanent_number                47 non-null     object 
 7   gender                          912 non-null    object 
 8   date_of_birth                   912 non-null    object 
 9   date_of_death                   501 non-null    object 
 10  place_of_birth                  912 non-null    object 
 11  country_of_birth_country_id     912 non-null    object 
 12  nationality_country_id          912 non-null    object 
 13  second_nationality_country_id   7 non-null      object 
 14  best_championship_position      384 non-null    float64
 15  best_starting_grid_position     791 non-null    float64
 16  best_race_result                678 non-null    float64
 17  total_championship_wins         912 non-null    int64  
 18  total_race_entries              912 non-null    int64  
 19  total_race_starts               912 non-null    int64  
 20  total_race_wins                 912 non-null    int64  
 21  total_race_laps                 912 non-null    int64  
 22  total_podiums                   912 non-null    int64  
 23  total_points                    912 non-null    float64
 24  total_championship_points       912 non-null    float64
 25  total_pole_positions            912 non-null    int64  
 26  total_fastest_laps              912 non-null    int64  
 27  total_driver_of_the_day         912 non-null    int64  
 28  total_grand_slams               912 non-null    int64  
dtypes: float64(5), int64(10), object(14)
memory usage: 206.8+ KB
```

```
driver =
driver.drop(columns=['full_name','permanent_number','gender','date_of_
birth','date_of_death','place_of_birth',

'country_of_birth_country_id','second_nationality_country_id','total_r
ace_entries',
```

```
'total_championship_points','total_driver_of_the_day'])
driver
```

	id	name	first_name	last_name	abbreviation	nationality_country_id
0	adderly-fong	Adderly Fong	Adderly	Fong	FON	hong-kong
1	adolf-brudes	Adolf Brudes	Adolf	Brudes	BRU	germany
2	adolfo-schwelm-cruz	Adolfo Schwelm Cruz	Adolfo	Schwelm Cruz	SCH	argentina
3	adrian-campos	Adrián Campos	Adrián	Campos	CAM	spain
4	adrian-sutil	Adrian Sutil	Adrian	Sutil	SUT	germany
..	...	...	...	...	...	...
907	yuji-ide	Yuji Ide	Yuji	Ide	IDE	japan
908	yuki-tsunoda	Yuki Tsunoda	Yuki	Tsunoda	TSU	japan
909	yves-giraud-cabantous	Yves Giraud-Cabantous	Yves	Giraud-Cabantous	CAB	france
910	zak-osullivan	Zak O'Sullivan	Zak	O'Sullivan	OSU	united-kingdom
911	zsolt-baumgartner	Zsolt Baumgartner	Zsolt	Baumgartner	BAU	hungary

	best_championship_position	best_starting_grid_position	best_race_result	total_championship_wins	total_race_starts
0	NaN	NaN	NaN	0	0
1	NaN	19.0	NaN	0	1
2	NaN	13.0	NaN	0	1
3	NaN	16.0	14.0	0	17
4	9.0	2.0	4.0	0	128
..	...	...	...	...	...
907	25.0	18.0	13.0	0	4
908	12.0	3.0			
909	14.0	5.0			
910	NaN	NaN			
911	20.0	17.0			

```
908                4.0                          0                  105
909                4.0                          0                   13
910                NaN                          0                    0
911                8.0                          0                   20

     total_race_wins  total_race_laps  total_podiums  total_points  \
0                  0                0              0           0.0
1                  0                5              0           0.0
2                  0               20              0           0.0
3                  0              433              0           0.0
4                  0             6022              0         124.0
..               ...              ...            ...           ...
907                0              145              0           0.0
908                0             5653              0         111.0
909                0              522              0           5.0
910                0                0              0           0.0
911                0              959              0           1.0

     total_pole_positions  total_fastest_laps  total_grand_slams
0                       0                   0                  0
1                       0                   0                  0
2                       0                   0                  0
3                       0                   0                  0
4                       0                   1                  0
..                    ...                 ...                ...
907                     0                   0                  0
908                     0                   1                  0
909                     0                   0                  0
910                     0                   0                  0
911                     0                   0                  0

[912 rows x 18 columns]
```

driver_by_season DataFrame

```
driver_by_season.info()

<class 'pandas.core.frame.DataFrame'>
RangeIndex: 3379 entries, 0 to 3378
Data columns (total 16 columns):
 #   Column                       Non-Null Count  Dtype
---  ------                       --------------  -----
 0   year                         3379 non-null   int64
 1   driver_id                    3379 non-null   object
 2   position_number              1657 non-null   float64
 3   position_text                1658 non-null   object
 4   best_starting_grid_position  3041 non-null   float64
 5   best_race_result             2652 non-null   float64
 6   total_race_entries           3379 non-null   int64
 7   total_race_starts            3379 non-null   int64
```

```
 8   total_race_wins               3379 non-null   int64
 9   total_race_laps               3379 non-null   int64
 10  total_podiums                 3379 non-null   int64
 11  total_points                  3379 non-null   float64
 12  total_pole_positions          3379 non-null   int64
 13  total_fastest_laps            3379 non-null   int64
 14  total_driver_of_the_day       3379 non-null   int64
 15  total_grand_slams             3379 non-null   int64
dtypes: float64(4), int64(10), object(2)
memory usage: 422.5+ KB
```

```
driver_by_season =
driver_by_season.drop(columns=['position_number','total_race_entries',
'total_driver_of_the_day'])
driver_by_season =
driver_by_season.rename(columns={'position_text':'position'})
driver_by_season
```

```
      year           driver_id position
best_starting_grid_position  \
0     1950  juan-manuel-fangio        2                           1.0

1     1950       luigi-fagioli        3                           2.0

2     1950         nino-farina        1                           1.0

3     1950         reg-parnell        9                           4.0

4     1950     consalvo-sanesi     None                           4.0

...    ...                ...      ...                           ...

3374  2025      lewis-hamilton        6                           4.0

3375  2025      dino-beganovic     None                           NaN

3376  2025   gabriel-bortoleto       18                           7.0

3377  2025     nico-hulkenberg       10                          11.0

3378  2025        isack-hadjar        9                           4.0


      best_race_result  total_race_starts  total_race_wins
total_race_laps  \
0                  1.0                  6                3
317
1                  2.0                  6                0
291
2                  1.0                  6                3
282
```

```
3                   3.0                    2                 0
80
4                   NaN                    1                 0
11
...                 ...                  ...               ...
...
3374                4.0                   18                 0
1030
3375                NaN                    0                 0
0
3376                6.0                   18                 0
986
3377                3.0                   17                 0
963
3378                3.0                   18                 0
983

      total_podiums  total_points  total_pole_positions
total_fastest_laps  \
0                 3          27.0                     4
3
1                 5          28.0                     0
0
2                 3          30.0                     2
3
3                 1           4.0                     0
0
4                 0           0.0                     0
0
...             ...           ...                   ...
...
3374              0         125.0                     0
1
3375              0           0.0                     0
0
3376              0          18.0                     0
0
3377              1          37.0                     0
0
3378              1          39.0                     0
0

      total_grand_slams
0                     0
1                     0
2                     0
3                     0
4                     0
...                 ...
```

```
3374                   0
3375                   0
3376                   0
3377                   0
3378                   0

[3379 rows x 13 columns]
```

race_data DataFrame

```
race_data.info()

<class 'pandas.core.frame.DataFrame'>
RangeIndex: 183632 entries, 0 to 183631
Data columns (total 71 columns):
 #   Column                                                Non-Null
Count   Dtype
---  ------
--------------   -----
 0   race_id                                               183632 non-
null  int64
 1   type                                                  183632 non-
null  object
 2   position_display_order                                183632 non-
null  int64
 3   position_number                                       172468 non-
null  float64
 4   position_text                                         183632 non-
null  object
 5   driver_number                                         183632 non-
null  object
 6   driver_id                                             183632 non-
null  object
 7   constructor_id                                        183632 non-
null  object
 8   engine_manufacturer_id                                183632 non-
null  object
 9   tyre_manufacturer_id                                  183632 non-
null  object
 10  practice_time                                         47260 non-
null   object
 11  practice_time_millis                                  47260 non-
null   float64
 12  practice_gap                                          45124 non-
null   object
 13  practice_gap_millis                                   45124 non-
null   float64
 14  practice_interval                                     45124 non-
null   object
 15  practice_interval_millis                              45124 non-
```

```
null   float64
 16  practice_laps                                          38322 non-
null   float64
 17  qualifying_time                                        33926 non-
null   object
 18  qualifying_time_millis                                 33926 non-
null   float64
 19  qualifying_q1                                          8470 non-
null    object
 20  qualifying_q1_millis                                   8470 non-
null    float64
 21  qualifying_q2                                          6216 non-
null    object
 22  qualifying_q2_millis                                   6216 non-
null    float64
 23  qualifying_q3                                          3952 non-
null    object
 24  qualifying_q3_millis                                   3952 non-
null    float64
 25  qualifying_gap                                         36049 non-
null   object
 26  qualifying_gap_millis                                  36049 non-
null   float64
 27  qualifying_interval                                    36036 non-
null   object
 28  qualifying_interval_millis                             36036 non-
null   float64
 29  qualifying_laps                                        17016 non-
null   float64
 30  starting_grid_position_qualification_position_number  25680 non-
null   float64
 31  starting_grid_position_qualification_position_text    25809 non-
null   object
 32  starting_grid_position_grid_penalty                    573 non-
null     object
 33  starting_grid_position_grid_penalty_positions          500 non-
null     float64
 34  starting_grid_position_time                            25258 non-
null   object
 35  starting_grid_position_time_millis                     25258 non-
null   float64
 36  race_shared_car                                        27591 non-
null   object
 37  race_laps                                              25664 non-
null   float64
 38  race_time                                              8318 non-
null    object
 39  race_time_millis                                       8318 non-
null    float64
```

```
 40  race_time_penalty                                  274 non-
null     object
 41  race_time_penalty_millis                           274 non-
null     float64
 42  race_gap                                           14822 non-
null   object
 43  race_gap_millis                                    7154 non-
null    float64
 44  race_gap_laps                                      7668 non-
null    float64
 45  race_interval                                      7136 non-
null    object
 46  race_interval_millis                               7136 non-
null    float64
 47  race_reason_retired                                9998 non-
null    object
 48  race_points                                        8505 non-
null    float64
 49  race_pole_position                                 27591 non-
null   object
 50  race_qualification_position_number                 26872 non-
null   float64
 51  race_qualification_position_text                   27009 non-
null   object
 52  race_grid_position_number                          25584 non-
null   float64
 53  race_grid_position_text                            25815 non-
null   object
 54  race_positions_gained                              16626 non-
null   float64
 55  race_pit_stops                                     12676 non-
null   float64
 56  race_fastest_lap                                   27571 non-
null   object
 57  race_driver_of_the_day                             4601 non-
null    object
 58  race_grand_slam                                    27591 non-
null   object
 59  fastest_lap_lap                                    16689 non-
null   float64
 60  fastest_lap_time                                   16736 non-
null   object
 61  fastest_lap_time_millis                            16736 non-
null   float64
 62  fastest_lap_gap                                    15593 non-
null   object
 63  fastest_lap_gap_millis                             15593 non-
null   float64
 64  fastest_lap_interval                               15593 non-
```

```
null   object
 65  fastest_lap_interval_millis                              15593 non-
null   float64
 66  pit_stop_stop                                            21889 non-
null   float64
 67  pit_stop_lap                                             21889 non-
null   float64
 68  pit_stop_time                                            21888 non-
null   object
 69  pit_stop_time_millis                                     21888 non-
null   float64
 70  driver_of_the_day_percentage                             720 non-
null     float64
dtypes: float64(34), int64(2), object(35)
memory usage: 99.5+ MB

race_data =
race_data.drop(columns=['position_display_order','position_number','dr
iver_number',

'engine_manufacturer_id','tyre_manufacturer_id','practice_time','pract
ice_time_millis',

'practice_gap','practice_gap_millis','qualifying_time_millis','qualify
ing_q1_millis',

'qualifying_q2_millis','qualifying_q3_millis','qualifying_interval',

'qualifying_interval_millis','starting_grid_position_qualification_pos
ition_number',

'starting_grid_position_time','starting_grid_position_time_millis','ra
ce_time_millis',

'race_gap','race_gap_millis','race_qualification_position_number',

'race_driver_of_the_day','fastest_lap_time_millis','fastest_lap_gap',

'fastest_lap_gap_millis','fastest_lap_interval','fastest_lap_interval_
millis',

'pit_stop_time_millis','driver_of_the_day_percentage'])
race_data = race_data.rename(columns={'position_text':'position'})
race_data

        race_id                      type position           driver_id
\
0           290     PRE_QUALIFYING_RESULT        1   gilles-villeneuve

1           290     PRE_QUALIFYING_RESULT        2      patrick-tambay
```

```
2           290     PRE_QUALIFYING_RESULT        3  jean-pierre-jarier
3           290     PRE_QUALIFYING_RESULT        4        brett-lunger
4           290     PRE_QUALIFYING_RESULT        5        brian-henton
...         ...                       ...      ...                 ...
183627     1143  DRIVER_OF_THE_DAY_RESULT        1     fernando-alonso
183628     1143  DRIVER_OF_THE_DAY_RESULT        2      george-russell
183629     1143  DRIVER_OF_THE_DAY_RESULT        3      max-verstappen
183630     1143  DRIVER_OF_THE_DAY_RESULT        4        lando-norris
183631     1143  DRIVER_OF_THE_DAY_RESULT        5      lewis-hamilton
```

```
       constructor_id practice_interval  practice_interval_millis  \
0              mclaren              None                      NaN
1               ensign              None                      NaN
2               penske              None                      NaN
3              mclaren              None                      NaN
4                march              None                      NaN
...                ...               ...                      ...
183627   aston-martin              None                      NaN
183628       mercedes              None                      NaN
183629       red-bull              None                      NaN
183630        mclaren              None                      NaN
183631        ferrari              None                      NaN

        practice_laps qualifying_time qualifying_q1  ...  \
0                 NaN        1:19.480          None  ...
1                 NaN        1:19.550          None  ...
2                 NaN        1:19.630          None  ...
3                 NaN        1:19.720          None  ...
4                 NaN        1:19.820          None  ...
...               ...             ...           ...  ...
183627            NaN            None          None  ...
183628            NaN            None          None  ...
183629            NaN            None          None  ...
183630            NaN            None          None  ...
183631            NaN            None          None  ...

       race_grid_position_text race_positions_gained race_pit_stops  \
0                         None                   NaN            NaN
1                         None                   NaN            NaN
2                         None                   NaN            NaN
```

```
3                          None                   NaN            NaN
4                          None                   NaN            NaN
...                         ...                   ...            ...
183627                     None                   NaN            NaN
183628                     None                   NaN            NaN
183629                     None                   NaN            NaN
183630                     None                   NaN            NaN
183631                     None                   NaN            NaN

        race_fastest_lap  race_grand_slam fastest_lap_lap
fastest_lap_time  \
0                   None             None             NaN
None
1                   None             None             NaN
None
2                   None             None             NaN
None
3                   None             None             NaN
None
4                   None             None             NaN
None
...                  ...              ...             ...
...
183627              None             None             NaN
None
183628              None             None             NaN
None
183629              None             None             NaN
None
183630              None             None             NaN
None
183631              None             None             NaN
None

        pit_stop_stop pit_stop_lap  pit_stop_time
0                 NaN          NaN           None
1                 NaN          NaN           None
2                 NaN          NaN           None
3                 NaN          NaN           None
4                 NaN          NaN           None
...               ...          ...            ...
183627            NaN          NaN           None
183628            NaN          NaN           None
183629            NaN          NaN           None
183630            NaN          NaN           None
183631            NaN          NaN           None

[183632 rows x 41 columns]
```

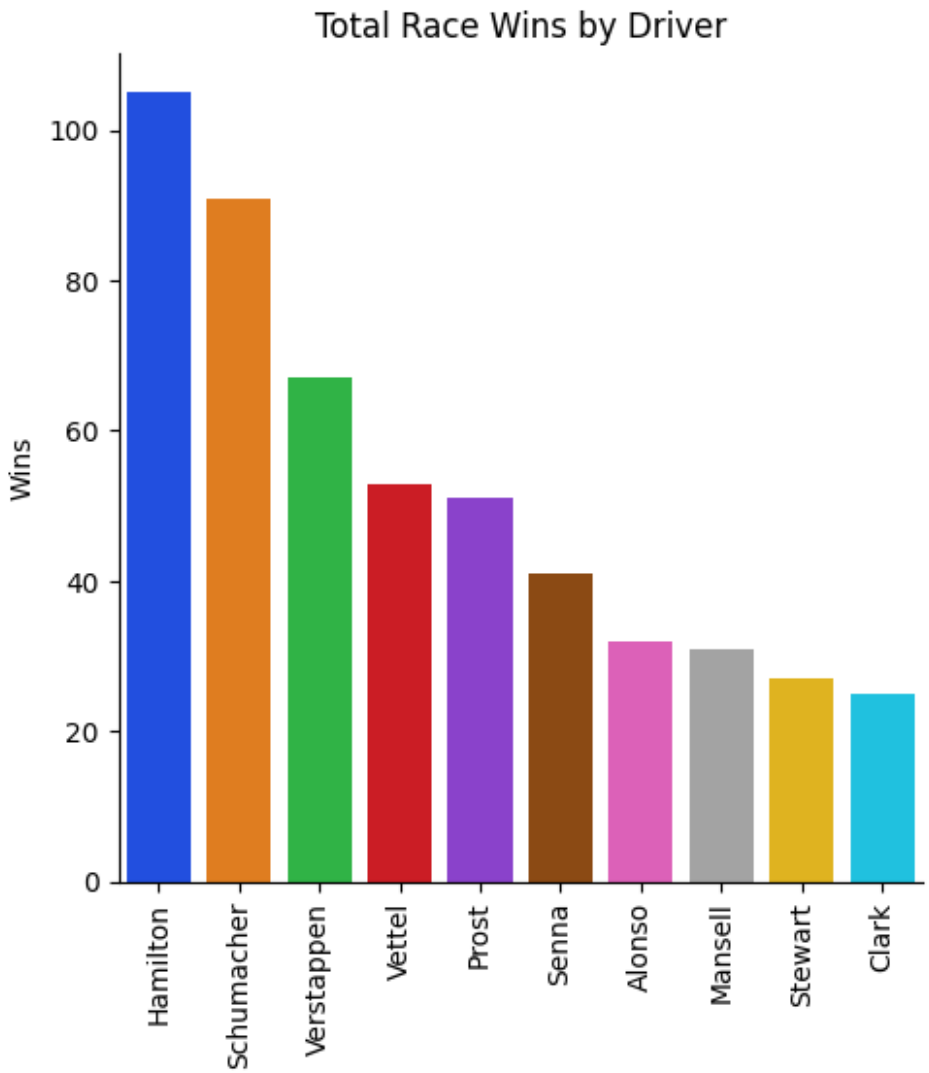
Analyzing Drivers

```
driver['win_rank'] = driver.total_race_wins.rank(method='max',
ascending=False)
top_10_wins = driver.sort_values('win_rank').head(10)
top_10_wins
```

```
                     id                 name first_name   last_name  \
558      lewis-hamilton      Lewis Hamilton      Lewis    Hamilton
619  michael-schumacher  Michael Schumacher    Michael  Schumacher
613      max-verstappen      Max Verstappen        Max  Verstappen
816    sebastian-vettel    Sebastian Vettel  Sebastian      Vettel
10          alain-prost         Alain Prost      Alain       Prost
70         ayrton-senna        Ayrton Senna     Ayrton       Senna
280     fernando-alonso     Fernando Alonso   Fernando      Alonso
659       nigel-mansell       Nigel Mansell      Nigel     Mansell
412      jackie-stewart      Jackie Stewart     Jackie     Stewart
448           jim-clark           Jim Clark        Jim       Clark

    abbreviation nationality_country_id  best_championship_position  \
558          HAM         united-kingdom                        1.0
619          MSC                germany                        1.0
613          VER            netherlands                        1.0
816          VET                germany                        1.0
10           PRO                 france                        1.0
70           SEN                 brazil                        1.0
280          ALO                  spain                        1.0
659          MAN         united-kingdom                        1.0
412          STE         united-kingdom                        1.0
448          CLA         united-kingdom                        1.0

     best_starting_grid_position  best_race_result
total_championship_wins  \
558                          1.0               1.0
7
619                          1.0               1.0
7
613                          1.0               1.0
4
816                          1.0               1.0
4
10                           1.0               1.0
4
70                           1.0               1.0
3
280                          1.0               1.0
2
659                          1.0               1.0
1
412                          1.0               1.0
```

```
3
448                          1.0                1.0
2

     total_race_starts  total_race_wins  total_race_laps
total_podiums  \
558                374              105            21325
202
619                306               91            16825
155
613                227               67            12329
121
816                299               53            16426
122
10                 199               51            10540
106
70                 161               41             8219
80
280                420               32            22758
106
659                187               31             8750
59
412                 99               27             5225
43
448                 72               25             3877
32

     total_points  total_pole_positions  total_fastest_laps  \
558        4987.5                   104                  68
619        1566.0                    68                  77
613        3296.5                    46                  35
816        3098.0                    57                  38
10          798.5                    33                  41
70          614.0                    65                  19
280        2373.0                    22                  26
659         482.0                    32                  30
412         360.0                    17                  15
448         274.0                    33                  28

     total_grand_slams  win_rank
558                  6       1.0
619                  5       2.0
613                  6       3.0
816                  4       4.0
10                   0       5.0
70                   4       6.0
280                  0       7.0
659                  4       8.0
412                  4       9.0
448                  8      11.0
```

```
g = sns.catplot(data=top_10_wins, kind='bar', x='last_name',
y='total_race_wins', errorbar=None, hue='last_name')
for ax in g.axes.flat:
    ax.set_title('Total Race Wins by Driver')
    ax.set_xlabel('')
    ax.set_ylabel('Wins')
    ax.tick_params('x', labelrotation=90)
```




```
driver['championship_rank'] =
driver.total_championship_wins.rank(method='max', ascending=False)
top_10_champs = driver.sort_values('championship_rank').head(10)
top_10_champs
```

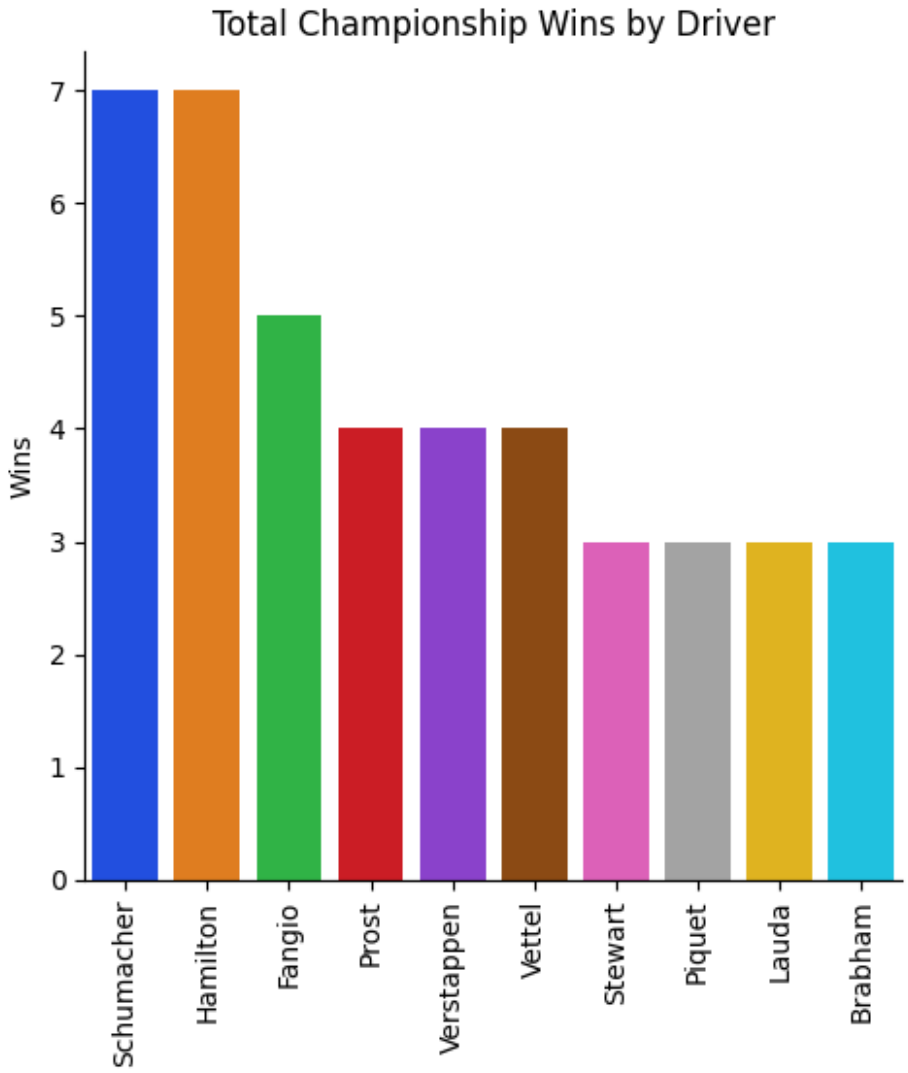
```
                     id                 name   first_name
last_name  \
619  michael-schumacher  Michael Schumacher      Michael  Schumacher
```

```
558      lewis-hamilton      Lewis Hamilton        Lewis    Hamilton
511  juan-manuel-fangio  Juan Manuel Fangio  Juan Manuel      Fangio
10          alain-prost         Alain Prost        Alain       Prost
613      max-verstappen      Max Verstappen          Max  Verstappen
816    sebastian-vettel    Sebastian Vettel    Sebastian      Vettel
412      jackie-stewart      Jackie Stewart       Jackie     Stewart
651       nelson-piquet       Nelson Piquet       Nelson      Piquet
660          niki-lauda          Niki Lauda         Niki       Lauda
403        jack-brabham        Jack Brabham         Jack     Brabham


    abbreviation nationality_country_id  best_championship_position  \
619          MSC                germany                        1.0
558          HAM         united-kingdom                        1.0
511          FAN              argentina                        1.0
10           PRO                 france                        1.0
613          VER            netherlands                        1.0
816          VET                germany                        1.0
412          STE         united-kingdom                        1.0
651          PIQ                 brazil                        1.0
660          LAU                austria                        1.0
403          BRA              australia                        1.0

     best_starting_grid_position  best_race_result
total_championship_wins  \
619                          1.0               1.0
7
558                          1.0               1.0
7
511                          1.0               1.0
5
10                           1.0               1.0
4
613                          1.0               1.0
4
816                          1.0               1.0
4
412                          1.0               1.0
3
651                          1.0               1.0
3
```

```
660                           1.0               1.0
3
403                           1.0               1.0
3

     total_race_starts  total_race_wins  total_race_laps
total_podiums  \
619                306                91            16825
155
558                374               105            21325
202
511                 51                24             2960
35
10                 199                51            10540
106
613                227                67            12329
121
816                299                53            16426
122
412                 99                27             5225
43
651                203                23             9870
60
660                171                25             8213
54
403                126                14             6124
31

     total_points  total_pole_positions  total_fastest_laps  \
619       1566.00                    68                  77
558       4987.50                   104                  68
511        277.64                    29                  23
10         798.50                    33                  41
613       3296.50                    46                  35
816       3098.00                    57                  38
412        360.00                    17                  15
651        485.50                    24                  23
660        420.50                    24                  24
403        261.00                    13                  12

     total_grand_slams  win_rank  championship_rank
619                  5       2.0                2.0
558                  6       1.0                2.0
511                  0      12.0                3.0
10                   0       5.0                6.0
613                  6       3.0                6.0
816                  4       4.0                6.0
412                  4       9.0               11.0
651                  3      14.0               11.0
```

```
660                    0      11.0                 11.0
403                    0      22.0                 11.0
```

```
p = sns.catplot(data=top_10_champs, kind='bar', x='last_name',
y='total_championship_wins', errorbar=None, hue='last_name')
for ax in p.axes.flat:
    ax.set_title('Total Championship Wins by Driver')
    ax.set_xlabel('')
    ax.set_ylabel('Wins')
    ax.tick_params('x', labelrotation=90)
```




```
# This is grand slams (where the driver gets pole position, leads
every lap, sets the fastest lap, and wins the race)
driver['slam_rank'] = driver.total_grand_slams.rank(method='max',
ascending=False)
```

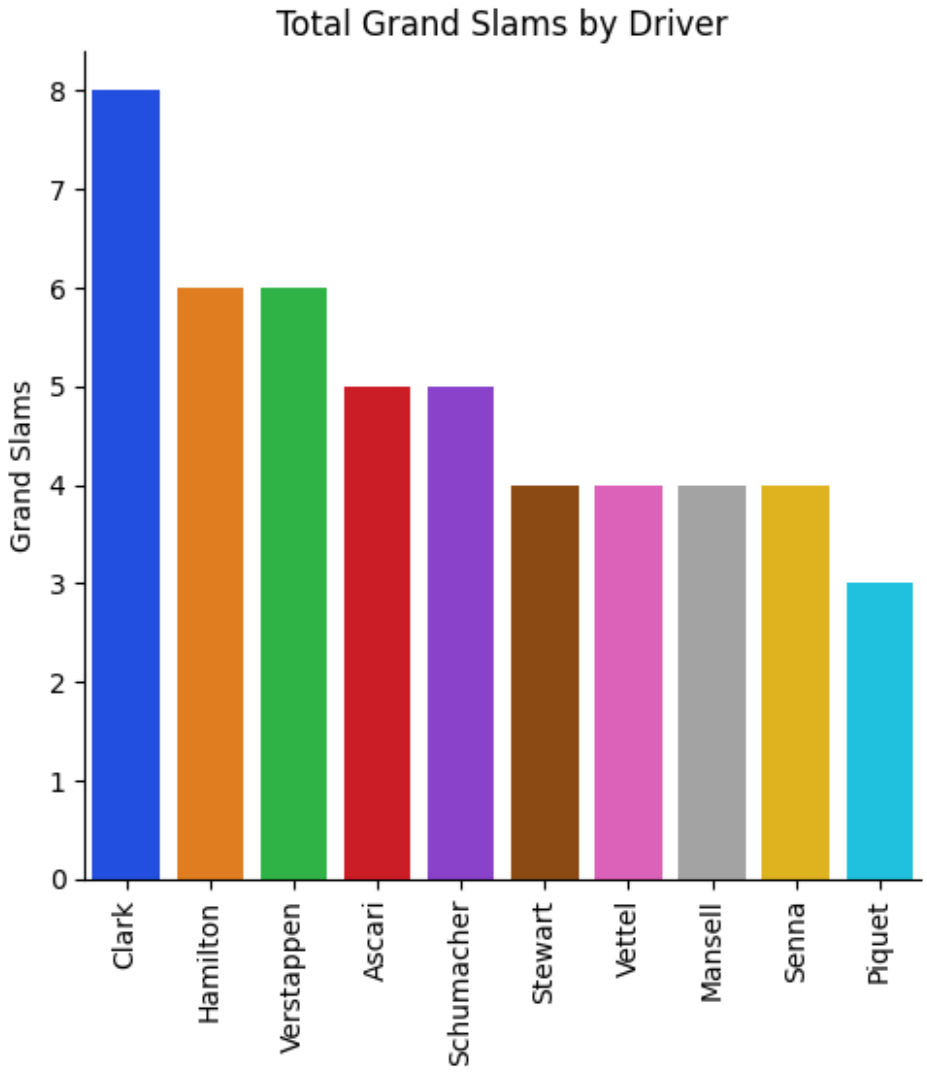
```
top_10_slams = driver.sort_values('slam_rank').head(10)
top_10_slams
```

```
                     id                 name first_name   last_name  \
448          jim-clark          Jim Clark        Jim       Clark
558      lewis-hamilton      Lewis Hamilton      Lewis    Hamilton
613      max-verstappen      Max Verstappen        Max  Verstappen
17       alberto-ascari      Alberto Ascari    Alberto      Ascari
619  michael-schumacher  Michael Schumacher    Michael  Schumacher
412      jackie-stewart      Jackie Stewart     Jackie     Stewart
816    sebastian-vettel    Sebastian Vettel  Sebastian      Vettel
659       nigel-mansell       Nigel Mansell      Nigel     Mansell
70         ayrton-senna        Ayrton Senna     Ayrton       Senna
651       nelson-piquet       Nelson Piquet     Nelson      Piquet

    abbreviation nationality_country_id  best_championship_position  \
448          CLA         united-kingdom                        1.0
558          HAM         united-kingdom                        1.0
613          VER            netherlands                        1.0
17           ASC                  italy                        1.0
619          MSC                germany                        1.0
412          STE         united-kingdom                        1.0
816          VET                germany                        1.0
659          MAN         united-kingdom                        1.0
70           SEN                 brazil                        1.0
651          PIQ                 brazil                        1.0

     best_starting_grid_position  best_race_result
total_championship_wins  \
448                          1.0               1.0
2
558                          1.0               1.0
7
613                          1.0               1.0
4
17                           1.0               1.0
2
619                          1.0               1.0
7
412                          1.0               1.0
3
816                          1.0               1.0
4
659                          1.0               1.0
1
70                           1.0               1.0
3
651                          1.0               1.0
3
```

```
     ...  total_race_wins  total_race_laps  total_podiums
total_points  \
448  ...                25             3877             32
274.00
558  ...               105            21325            202
4987.50
613  ...                67            12329            121
3296.50
17   ...                13             1609             17
140.14
619  ...                91            16825            155
1566.00
412  ...                27             5225             43
360.00
816  ...                53            16426            122
3098.00
659  ...                31             8750             59
482.00
70   ...                41             8219             80
614.00
651  ...                23             9870             60
485.50

     total_pole_positions  total_fastest_laps  total_grand_slams
win_rank  \
448                    33                  28                  8
11.0
558                   104                  68                  6
1.0
613                    46                  35                  6
3.0
17                     14                  13                  5
24.0
619                    68                  77                  5
2.0
412                    17                  15                  4
9.0
816                    57                  38                  4
4.0
659                    32                  30                  4
8.0
70                     65                  19                  4
6.0
651                    24                  23                  3
14.0

     championship_rank  slam_rank
448               17.0        1.0
558                2.0        3.0
613                6.0        3.0
```

```
17                  17.0          5.0
619                  2.0          5.0
412                 11.0          9.0
816                  6.0          9.0
659                 34.0          9.0
70                  11.0          9.0
651                 11.0         10.0

[10 rows x 21 columns]
```

```
w = sns.catplot(data=top_10_slams, kind='bar', x='last_name',
y='total_grand_slams', errorbar=None, hue='last_name')
for ax in w.axes.flat:
    ax.set_title('Total Grand Slams by Driver')
    ax.set_xlabel('')
    ax.set_ylabel('Grand Slams')
    ax.tick_params('x', labelrotation=90)
```



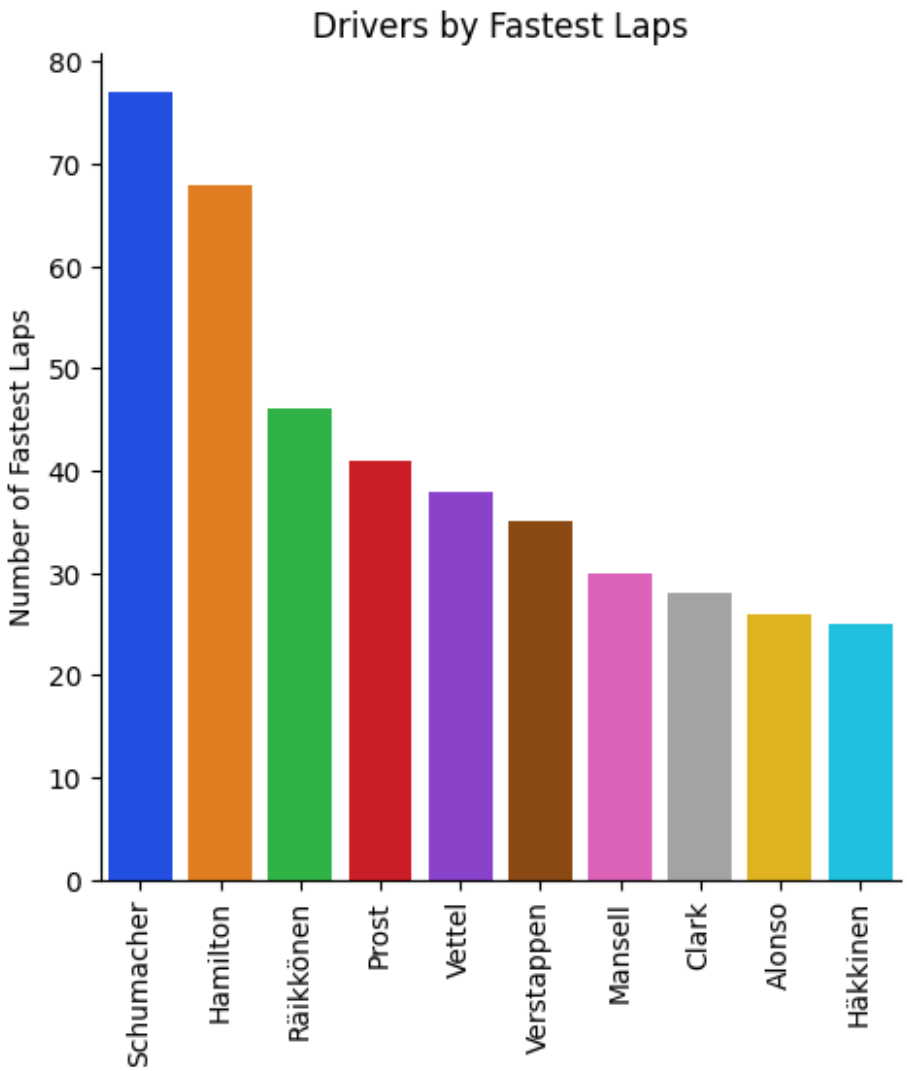
```
driver['fastest_lap_rank'] =
driver.total_fastest_laps.rank(method='max', ascending=False)
top_10_fast_laps = driver.sort_values('fastest_lap_rank').head(10)
top_10_fast_laps
```

```
                     id                 name first_name   last_name  \
619  michael-schumacher  Michael Schumacher    Michael  Schumacher
558      lewis-hamilton      Lewis Hamilton      Lewis    Hamilton
537      kimi-raikkonen      Kimi Räikkönen       Kimi   Räikkönen
10          alain-prost         Alain Prost      Alain       Prost
816    sebastian-vettel    Sebastian Vettel  Sebastian      Vettel
613      max-verstappen      Max Verstappen        Max  Verstappen
659       nigel-mansell       Nigel Mansell      Nigel     Mansell
448           jim-clark           Jim Clark        Jim       Clark
280     fernando-alonso     Fernando Alonso   Fernando      Alonso
624       mika-hakkinen       Mika Häkkinen       Mika    Häkkinen

    abbreviation nationality_country_id  best_championship_position  \
619          MSC                germany                        1.0
558          HAM         united-kingdom                        1.0
537          RAI                finland                        1.0
10           PRO                 france                        1.0
816          VET                germany                        1.0
613          VER            netherlands                        1.0
659          MAN         united-kingdom                        1.0
448          CLA         united-kingdom                        1.0
280          ALO                  spain                        1.0
624          HAK                finland                        1.0

     best_starting_grid_position  best_race_result
total_championship_wins  \
619                          1.0               1.0
7
558                          1.0               1.0
7
537                          1.0               1.0
1
10                           1.0               1.0
4
816                          1.0               1.0
4
613                          1.0               1.0
4
659                          1.0               1.0
1
448                          1.0               1.0
2
280                          1.0               1.0
2
624                          1.0               1.0
```

```
2

     ...  total_race_laps  total_podiums  total_points
total_pole_positions  \
619  ...             16825            155        1566.0
68
558  ...             21325            202        4987.5
104
537  ...             18621            103        1873.0
18
10   ...             10540            106         798.5
33
816  ...             16426            122        3098.0
57
613  ...             12329            121        3296.5
46
659  ...              8750             59         482.0
32
448  ...              3877             32         274.0
33
280  ...             22758            106        2373.0
22
624  ...              7719             51         420.0
26

     total_fastest_laps  total_grand_slams  win_rank
championship_rank  \
619                  77                  5       2.0
2.0
558                  68                  6       1.0
2.0
537                  46                  0      16.0
34.0
10                   41                  0       5.0
6.0
816                  38                  4       4.0
6.0
613                  35                  6       3.0
6.0
659                  30                  4       8.0
34.0
448                  28                  8      11.0
17.0
280                  26                  0       7.0
17.0
624                  25                  0      17.0
17.0

     slam_rank  fastest_lap_rank
619        5.0               1.0
```

```
558        3.0                2.0
537      912.0                3.0
10       912.0                4.0
816        9.0                5.0
613        3.0                6.0
659        9.0                7.0
448        1.0                8.0
280      912.0                9.0
624      912.0               10.0

[10 rows x 22 columns]
```

```
f = sns.catplot(data=top_10_fast_laps, kind='bar', x='last_name',
y='total_fastest_laps', errorbar=None, hue='last_name')
for ax in f.axes.flat:
    ax.set_title('Drivers by Fastest Laps')
    ax.set_xlabel('')
    ax.set_ylabel('Number of Fastest Laps')
    ax.tick_params('x', labelrotation=90)
```




```
# This is by podiums which means first, second, or third
driver['podium_rank'] = driver.total_podiums.rank(method='max',
ascending=False)
top_10_podiums = driver.sort_values('podium_rank').head(10)
top_10_podiums
```

	id	name	first_name	last_name	\
558	lewis-hamilton	Lewis Hamilton	Lewis	Hamilton	
619	michael-schumacher	Michael Schumacher	Michael	Schumacher	
816	sebastian-vettel	Sebastian Vettel	Sebastian	Vettel	
613	max-verstappen	Max Verstappen	Max	Verstappen	
10	alain-prost	Alain Prost	Alain	Prost	
280	fernando-alonso	Fernando Alonso	Fernando	Alonso	
537	kimi-raikkonen	Kimi Räikkönen	Kimi	Räikkönen	
70	ayrton-senna	Ayrton Senna	Ayrton	Senna	
801	rubens-barrichello	Rubens Barrichello	Rubens	Barrichello	
881	valtteri-bottas	Valtteri Bottas	Valtteri	Bottas	

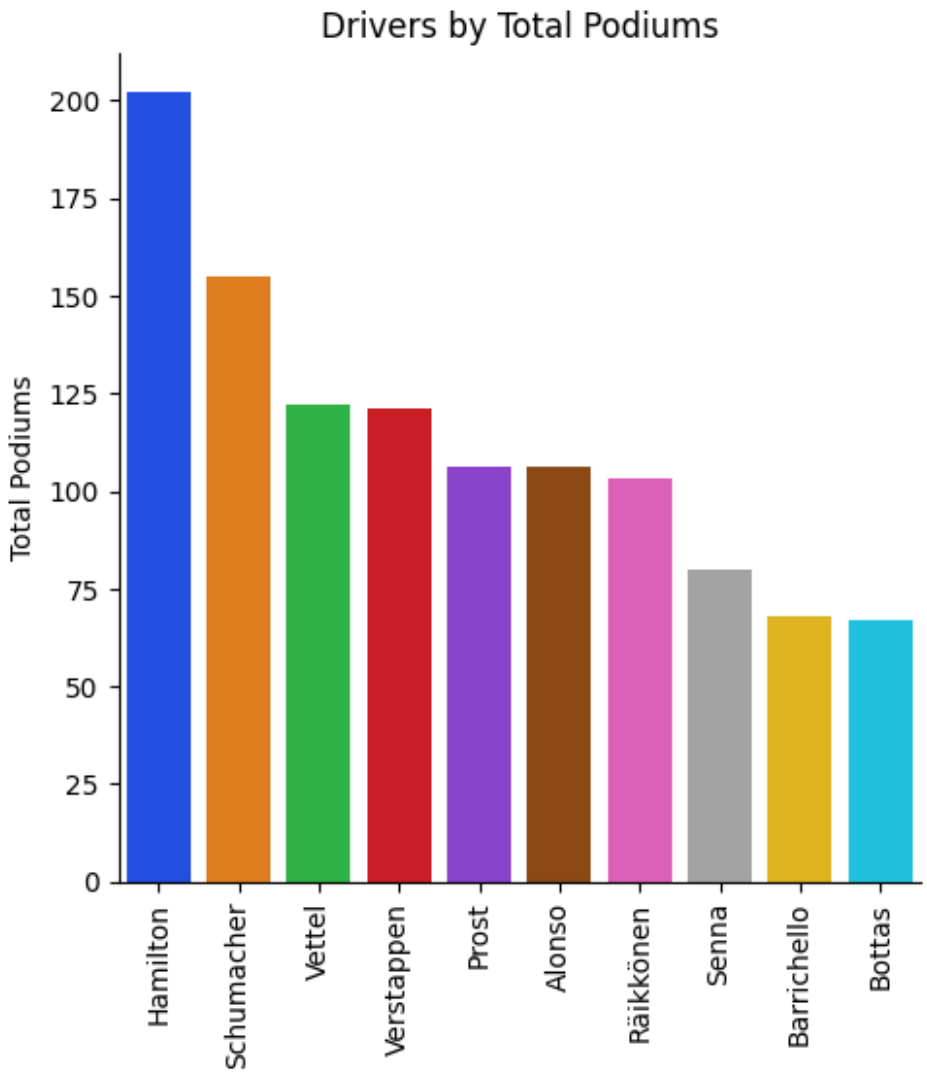
```
    abbreviation nationality_country_id  best_championship_position  \
558          HAM         united-kingdom                        1.0
619          MSC                germany                        1.0
816          VET                germany                        1.0
613          VER            netherlands                        1.0
10           PRO                 france                        1.0
280          ALO                  spain                        1.0
537          RAI                finland                        1.0
70           SEN                 brazil                        1.0
801          BAR                 brazil                        2.0
881          BOT                finland                        2.0

     best_starting_grid_position  best_race_result
total_championship_wins  \
558                          1.0               1.0
7
619                          1.0               1.0
7
816                          1.0               1.0
4
613                          1.0               1.0
4
10                           1.0               1.0
4
280                          1.0               1.0
2
537                          1.0               1.0
1
70                           1.0               1.0
3
801                          1.0               1.0
0
881                          1.0               1.0
0

     ...  total_podiums  total_points  total_pole_positions  \
558  ...            202        4987.5                   104
619  ...            155        1566.0                    68
816  ...            122        3098.0                    57
613  ...            121        3296.5                    46
10   ...            106         798.5                    33
280  ...            106        2373.0                    22
537  ...            103        1873.0                    18
70   ...             80         614.0                    65
801  ...             68         658.0                    14
881  ...             67        1797.0                    20

     total_fastest_laps  total_grand_slams  win_rank
championship_rank  \
```

```
558                   68                    6       1.0
2.0
619                   77                    5       2.0
2.0
816                   38                    4       4.0
6.0
613                   35                    6       3.0
6.0
10                    41                    0       5.0
6.0
280                   26                    0       7.0
17.0
537                   46                    0      16.0
34.0
70                    19                    4       6.0
11.0
801                   17                    0      30.0
912.0
881                   19                    0      35.0
912.0
```

	slam_rank	fastest_lap_rank	podium_rank
558	3.0	2.0	1.0
619	5.0	1.0	2.0
816	9.0	5.0	3.0
613	3.0	6.0	4.0
10	912.0	4.0	6.0
280	912.0	9.0	6.0
537	912.0	3.0	7.0
70	9.0	20.0	8.0
801	912.0	24.0	9.0
881	912.0	20.0	10.0

```
[10 rows x 23 columns]
```

```
po = sns.catplot(data=top_10_podiums, kind='bar', x='last_name',
y='total_podiums', errorbar=None, hue='last_name')
for ax in po.axes.flat:
    ax.set_title('Drivers by Total Podiums')
    ax.set_xlabel('')
    ax.set_ylabel('Total Podiums')
    ax.tick_params('x', labelrotation=90)
```



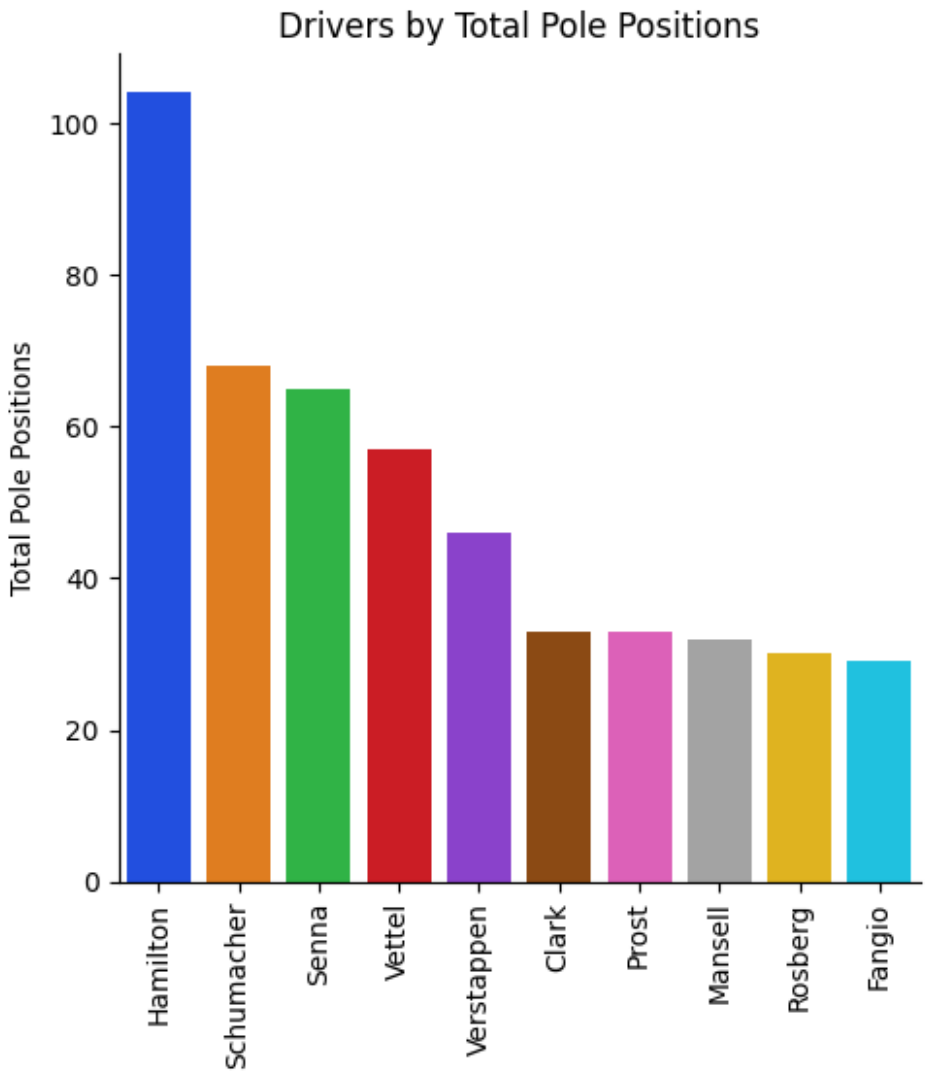

```
driver['pole_position_rank'] =
driver.total_pole_positions.rank(method='max', ascending=False)
top_10_pole_positions =
driver.sort_values('pole_position_rank').head(10)
top_10_pole_positions
```

```
                      id                 name   first_name
last_name  \
558      lewis-hamilton      Lewis Hamilton        Lewis    Hamilton

619  michael-schumacher  Michael Schumacher      Michael  Schumacher

70         ayrton-senna        Ayrton Senna       Ayrton       Senna

816    sebastian-vettel    Sebastian Vettel    Sebastian      Vettel

613      max-verstappen      Max Verstappen          Max  Verstappen
```

```
448           jim-clark           Jim Clark          Jim       Clark

10          alain-prost         Alain Prost        Alain       Prost

659       nigel-mansell       Nigel Mansell        Nigel     Mansell

656        nico-rosberg        Nico Rosberg         Nico     Rosberg

511  juan-manuel-fangio  Juan Manuel Fangio  Juan Manuel      Fangio


    abbreviation nationality_country_id  best_championship_position  \
558          HAM         united-kingdom                        1.0
619          MSC                germany                        1.0
70           SEN                 brazil                        1.0
816          VET                germany                        1.0
613          VER            netherlands                        1.0
448          CLA         united-kingdom                        1.0
10           PRO                 france                        1.0
659          MAN         united-kingdom                        1.0
656          ROS                germany                        1.0
511          FAN              argentina                        1.0

     best_starting_grid_position  best_race_result
total_championship_wins  \
558                          1.0               1.0
7
619                          1.0               1.0
7
70                           1.0               1.0
3
816                          1.0               1.0
4
613                          1.0               1.0
4
448                          1.0               1.0
2
10                           1.0               1.0
4
659                          1.0               1.0
1
656                          1.0               1.0
1
511                          1.0               1.0
5

     ...  total_points  total_pole_positions  total_fastest_laps  \
558  ...       4987.50                   104                  68
619  ...       1566.00                    68                  77
```

```
70   ...        614.00                    65                    19
816  ...       3098.00                    57                    38
613  ...       3296.50                    46                    35
448  ...        274.00                    33                    28
10   ...        798.50                    33                    41
659  ...        482.00                    32                    30
656  ...       1594.50                    30                    20
511  ...        277.64                    29                    23

     total_grand_slams  win_rank  championship_rank  slam_rank  \
558                  6       1.0                2.0        3.0
619                  5       2.0                2.0        5.0
70                   4       6.0               11.0        9.0
816                  4       4.0                6.0        9.0
613                  6       3.0                6.0        3.0
448                  8      11.0               17.0        1.0
10                   0       5.0                6.0      912.0
659                  4       8.0               34.0        9.0
656                  0      14.0               34.0      912.0
511                  0      12.0                3.0      912.0

     fastest_lap_rank  podium_rank  pole_position_rank
558               2.0          1.0                 1.0
619               1.0          2.0                 2.0
70               20.0          8.0                 3.0
816               5.0          3.0                 4.0
613               6.0          4.0                 5.0
448               8.0         36.0                 7.0
10                4.0          6.0                 7.0
659               7.0         13.0                 8.0
656              15.0         14.0                 9.0
511              13.0         30.0                10.0

[10 rows x 24 columns]
```

```
pole = sns.catplot(data=top_10_pole_positions, kind='bar',
x='last_name', y='total_pole_positions', errorbar=None,
                   hue='last_name')
for ax in pole.axes.flat:
    ax.set_title('Drivers by Total Pole Positions')
    ax.set_xlabel('')
    ax.set_ylabel('Total Pole Positions')
    ax.tick_params('x', labelrotation=90)
```




```
driver['points_rank'] = driver.total_points.rank(method='max',
ascending=False)
top_10_points = driver.sort_values('points_rank').head(10)
top_10_points
```

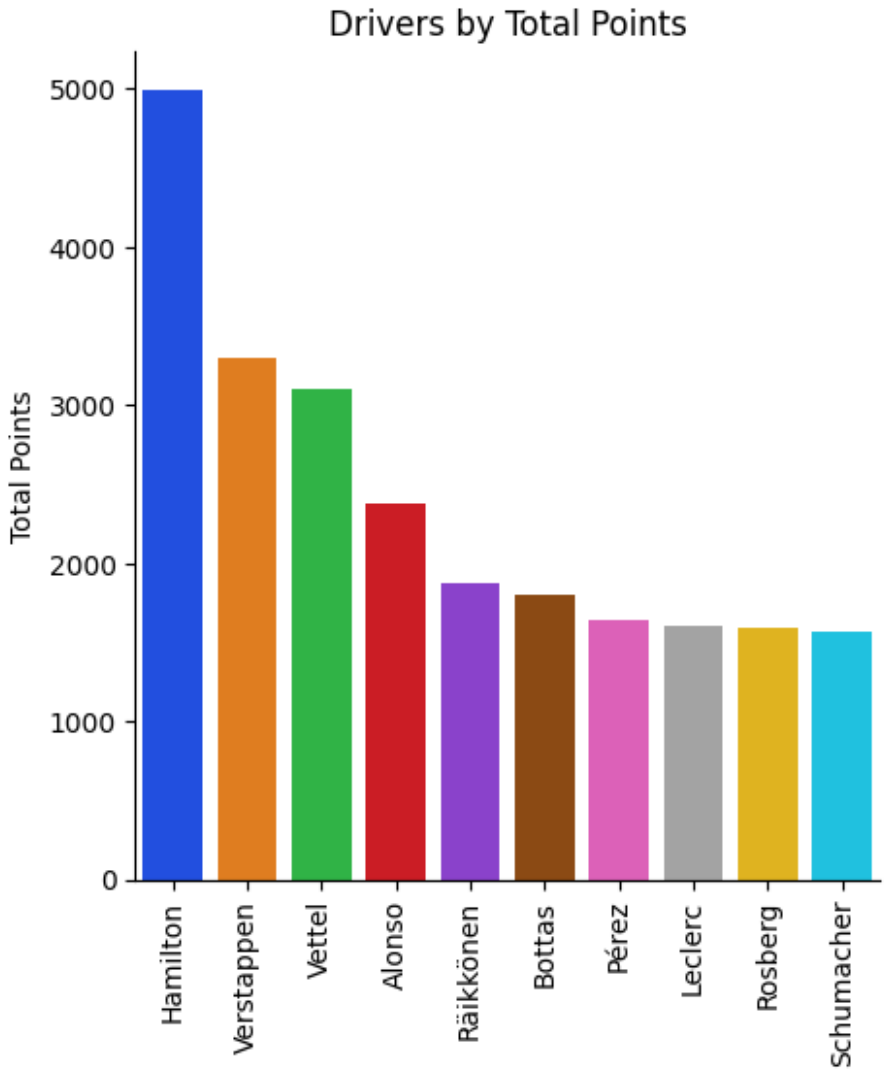
	id	name	first_name	last_name	\
558	lewis-hamilton	Lewis Hamilton	Lewis	Hamilton	
613	max-verstappen	Max Verstappen	Max	Verstappen	
816	sebastian-vettel	Sebastian Vettel	Sebastian	Vettel	
280	fernando-alonso	Fernando Alonso	Fernando	Alonso	
537	kimi-raikkonen	Kimi Räikkönen	Kimi	Räikkönen	
881	valtteri-bottas	Valtteri Bottas	Valtteri	Bottas	
821	sergio-perez	Sergio Pérez	Sergio	Pérez	
145	charles-leclerc	Charles Leclerc	Charles	Leclerc	
656	nico-rosberg	Nico Rosberg	Nico	Rosberg	
619	michael-schumacher	Michael Schumacher	Michael	Schumacher	

```
    abbreviation nationality_country_id  best_championship_position  \
558          HAM         united-kingdom                        1.0
613          VER            netherlands                        1.0
816          VET                germany                        1.0
280          ALO                  spain                        1.0
537          RAI                finland                        1.0
881          BOT                finland                        2.0
821          PER                 mexico                        2.0
145          LEC                 monaco                        2.0
656          ROS                germany                        1.0
619          MSC                germany                        1.0

     best_starting_grid_position  best_race_result
total_championship_wins  \
558                          1.0               1.0
7
613                          1.0               1.0
4
816                          1.0               1.0
4
280                          1.0               1.0
2
537                          1.0               1.0
1
881                          1.0               1.0
0
821                          1.0               1.0
0
145                          1.0               1.0
0
656                          1.0               1.0
1
619                          1.0               1.0
7

     ...  total_pole_positions  total_fastest_laps  total_grand_slams
\
558  ...                   104                  68                  6

613  ...                    46                  35                  6

816  ...                    57                  38                  4

280  ...                    22                  26                  0

537  ...                    18                  46                  0

881  ...                    20                  19                  0

821  ...                     3                  12                  0
```

```
145  ...                    27                  10                   0

656  ...                    30                  20                   0

619  ...                    68                  77                   5


     win_rank  championship_rank  slam_rank  fastest_lap_rank
podium_rank  \
558       1.0                2.0        3.0               2.0
1.0
613       3.0                6.0        3.0               6.0
4.0
816       4.0                6.0        9.0               5.0
3.0
280       7.0               17.0      912.0               9.0
6.0
537      16.0               34.0      912.0               3.0
7.0
881      35.0              912.0      912.0              20.0
10.0
821      52.0              912.0      912.0              35.0
26.0
145      42.0              912.0      912.0              40.0
19.0
656      14.0               34.0      912.0              15.0
14.0
619       2.0                2.0        5.0               1.0
2.0

     pole_position_rank  points_rank
558                 1.0          1.0
613                 5.0          2.0
816                 4.0          3.0
280                15.0          4.0
537                20.0          5.0
881                17.0          6.0
821                68.0          7.0
145                11.0          8.0
656                 9.0          9.0
619                 2.0         10.0

[10 rows x 25 columns]
```

```
point = sns.catplot(data=top_10_points, kind='bar', x='last_name',
y='total_points', errorbar=None, hue='last_name')
for ax in point.axes.flat:
    ax.set_title('Drivers by Total Points')
    ax.set_xlabel('')
```

```
    ax.set_ylabel('Total Points')
    ax.tick_params('x', labelrotation=90)
```



Amount of Seasons and Races Driver has Competed in

```
season_group = driver_by_season.groupby('driver_id')
driver_season = season_group[['year']].count()
driver_season = driver_season.reset_index()
driver_season =
driver_season.rename(columns={'year':'seasons','driver_id':'id'})
driver_season
```

```
                        id  seasons
0             adderly-fong        1
1             adolf-brudes        1
2     adolfo-schwelm-cruz         1
```

```
3            adrian-campos        2
4             adrian-sutil        8
..                     ...      ...
907              yuji-ide        1
908           yuki-tsunoda        5
909  yves-giraud-cabantous        4
910          zak-osullivan        1
911      zsolt-baumgartner        2

[912 rows x 2 columns]
```

```
# Adding the driver names to the driver_season DataFrame
driver_names = driver[['name','first_name','last_name','id']]
driver_merged = driver_season.merge(driver_names, on='id')
driver_merged
```

```
                         id  seasons                    name first_name
\
0              adderly-fong        1            Adderly Fong    Adderly

1              adolf-brudes        1            Adolf Brudes      Adolf

2      adolfo-schwelm-cruz        1    Adolfo Schwelm Cruz     Adolfo

3            adrian-campos        2          Adrián Campos     Adrián

4             adrian-sutil        8           Adrian Sutil     Adrian

..                     ...      ...                    ...        ...

907              yuji-ide        1               Yuji Ide       Yuji

908           yuki-tsunoda        5           Yuki Tsunoda       Yuki

909  yves-giraud-cabantous        4  Yves Giraud-Cabantous       Yves

910          zak-osullivan        1         Zak O'Sullivan        Zak

911      zsolt-baumgartner        2      Zsolt Baumgartner      Zsolt


            last_name
0                Fong
1              Brudes
2        Schwelm Cruz
3              Campos
4               Sutil
..                ...
907               Ide
908           Tsunoda
909  Giraud-Cabantous
```

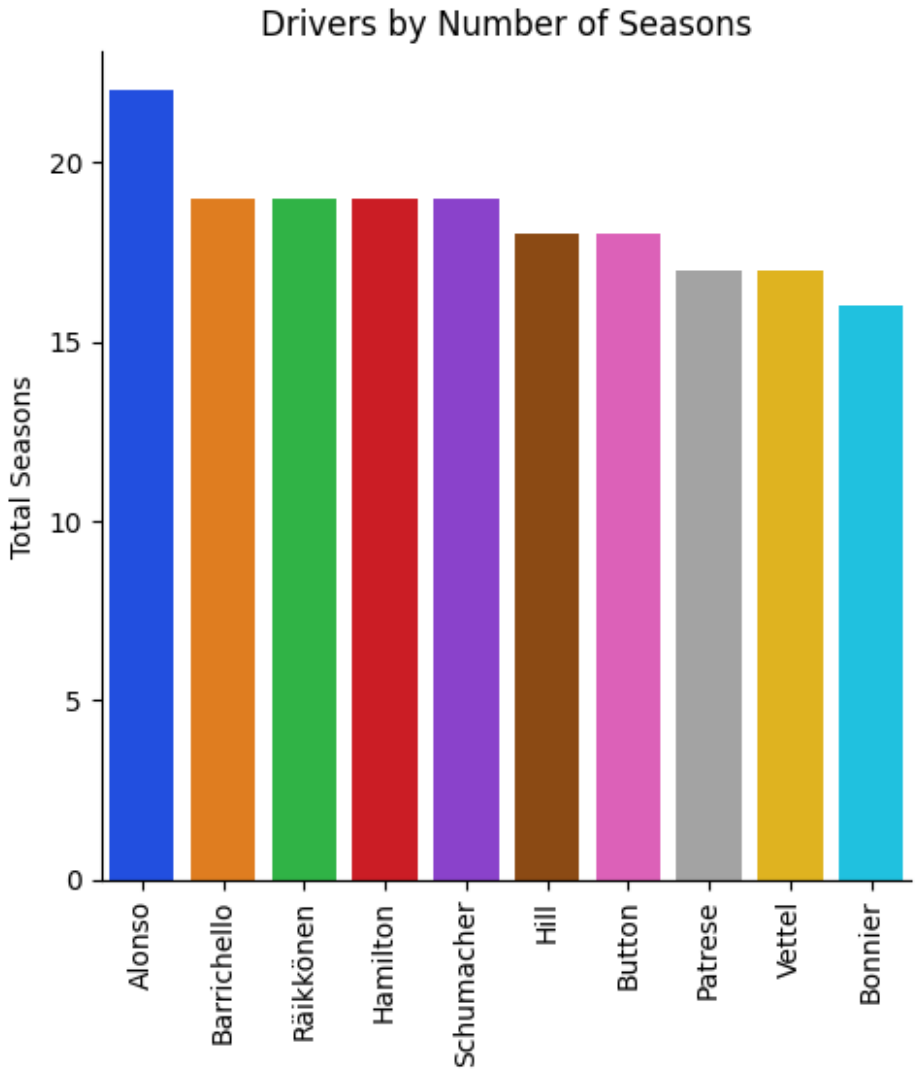
```
910        O'Sullivan
911       Baumgartner

[912 rows x 5 columns]
```

```
driver_merged['seasons_ranked'] =
driver_merged.seasons.rank(method='max', ascending=False)
top_10_seasons = driver_merged.sort_values('seasons_ranked').head(10)
top_10_seasons
```

```
                     id  seasons                name first_name
last_name  \
280     fernando-alonso       22     Fernando Alonso   Fernando
Alonso
801  rubens-barrichello       19  Rubens Barrichello     Rubens
Barrichello
536      kimi-raikkonen       19      Kimi Räikkönen       Kimi
Räikkönen
557      lewis-hamilton       19      Lewis Hamilton      Lewis
Hamilton
619  michael-schumacher       19  Michael Schumacher    Michael
Schumacher
345         graham-hill       18         Graham Hill     Graham
Hill
442       jenson-button       18       Jenson Button     Jenson
Button
761    riccardo-patrese       17    Riccardo Patrese   Riccardo
Patrese
816    sebastian-vettel       17    Sebastian Vettel  Sebastian
Vettel
461          jo-bonnier       16          Jo Bonnier         Jo
Bonnier

     seasons_ranked
280             1.0
801             5.0
536             5.0
557             5.0
619             5.0
345             7.0
442             7.0
761             9.0
816             9.0
461            11.0
```

```
se = sns.catplot(data=top_10_seasons, kind='bar', x='last_name',
y='seasons', errorbar=None, hue='last_name')
for ax in se.axes.flat:
    ax.set_title('Drivers by Number of Seasons')
    ax.set_xlabel('')
```

```
    ax.set_ylabel('Total Seasons')
    ax.tick_params('x', labelrotation=90)
```



It is worth noting that Alonso and Hamilton are current drivers.

```
races_grouped = race_data.groupby('driver_id')
career_races = races_grouped[['race_id']].nunique()
career_races = career_races.reset_index()
career_races =
career_races.rename(columns={'driver_id':'id','race_id':'races'})
career_races
```

	id	races
0	adderly-fong	1
1	adolf-brudes	1
2	adolfo-schwelm-cruz	1

```
3            adrian-campos     21
4             adrian-sutil    131
..                     ...    ...
904              yuji-ide      4
905           yuki-tsunoda    108
906  yves-giraud-cabantous     13
907          zak-osullivan      1
908      zsolt-baumgartner     20

[909 rows x 2 columns]
```

```
races_merged = career_races.merge(driver_names, on='id')
races_merged
```

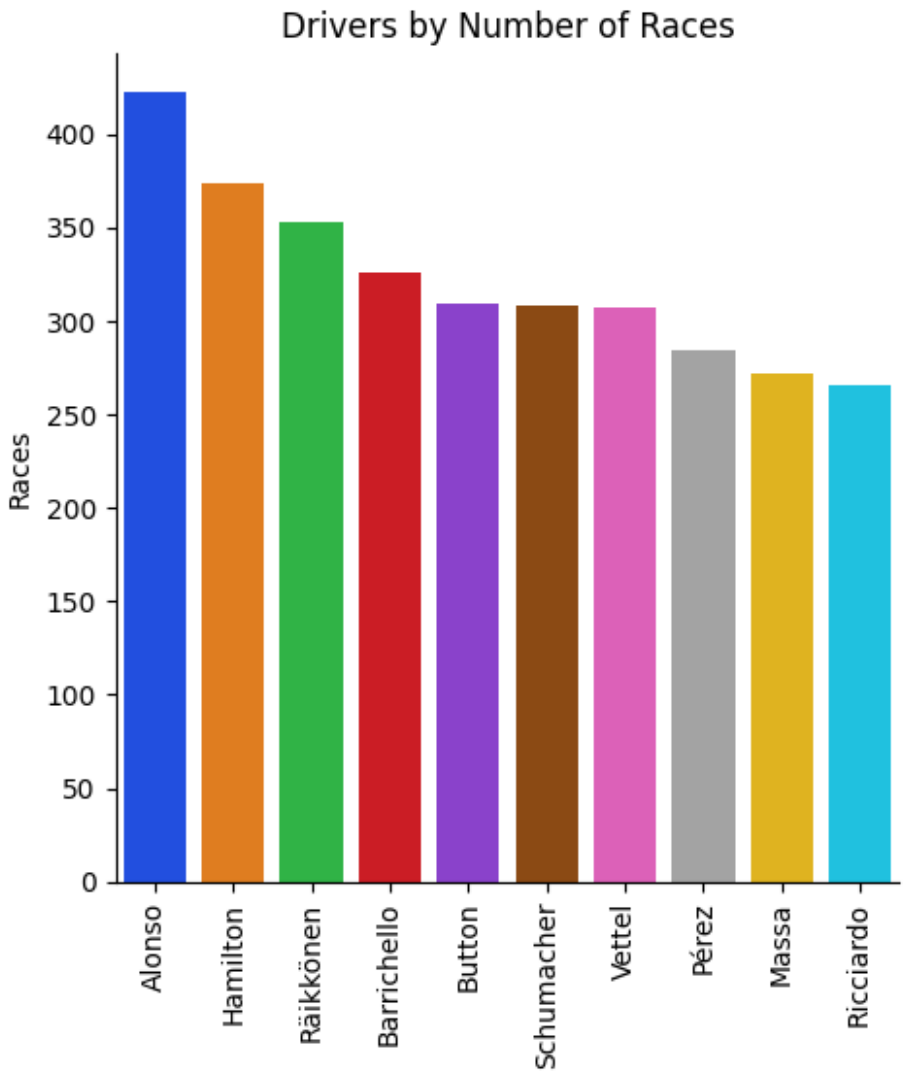
```
                        id  races                    name first_name  \
0             adderly-fong      1            Adderly Fong    Adderly
1             adolf-brudes      1            Adolf Brudes      Adolf
2      adolfo-schwelm-cruz      1    Adolfo Schwelm Cruz     Adolfo
3            adrian-campos     21          Adrián Campos     Adrián
4             adrian-sutil    131            Adrian Sutil     Adrian
..                     ...    ...                     ...        ...
904              yuji-ide      4              Yuji Ide       Yuji
905           yuki-tsunoda    108            Yuki Tsunoda       Yuki
906  yves-giraud-cabantous     13  Yves Giraud-Cabantous       Yves
907          zak-osullivan      1          Zak O'Sullivan        Zak
908      zsolt-baumgartner     20      Zsolt Baumgartner      Zsolt

            last_name
0                Fong
1              Brudes
2        Schwelm Cruz
3               Campos
4                Sutil
..                 ...
904               Ide
905           Tsunoda
906  Giraud-Cabantous
907         O'Sullivan
908        Baumgartner

[909 rows x 5 columns]
```

```
races_merged['races_rank'] = races_merged.races.rank(method='max',
ascending=False)
top_10_races = races_merged.sort_values('races_rank').head(10)
top_10_races
```

```
                     id  races                name first_name
last_name  \
279     fernando-alonso    422     Fernando Alonso   Fernando
```

```
Alonso
556      lewis-hamilton    374      Lewis Hamilton      Lewis
Hamilton
535      kimi-raikkonen    353      Kimi Räikkönen       Kimi
Räikkönen
799  rubens-barrichello    326  Rubens Barrichello     Rubens
Barrichello
441       jenson-button    309       Jenson Button     Jenson
Button
617  michael-schumacher    308  Michael Schumacher    Michael
Schumacher
813    sebastian-vettel    307    Sebastian Vettel  Sebastian
Vettel
818        sergio-perez    284        Sergio Pérez     Sergio
Pérez
277        felipe-massa    272        Felipe Massa     Felipe
Massa
184    daniel-ricciardo    266    Daniel Ricciardo     Daniel
Ricciardo

     races_rank
279         1.0
556         2.0
535         3.0
799         4.0
441         5.0
617         6.0
813         7.0
818         8.0
277         9.0
184        10.0
```

```
re = sns.catplot(data=top_10_races, kind='bar', x='last_name',
y='races', errorbar=None, hue='last_name')
for ax in re.axes.flat:
    ax.set_title('Drivers by Number of Races')
    ax.set_xlabel('')
    ax.set_ylabel('Races')
    ax.tick_params('x', labelrotation=90)
```



Top 10 Drivers Analysis

I chose our top 10 drivers based on how many times they appeared in the top 10 of the previous statistics. Lewis Hamilton, Michael Schumacher, and Sebastian Vettel with 9 each. Max Verstappen with 7. Fernando Alonso with 6. Alain Prost and Kimi Räikkönen with 5 each. Aryton Senna, Nigel Mansell, and Jim Clark with 4 each.

```
# Reclean Driver
driver_cleaned =
driver.drop(columns=['win_rank','championship_rank','slam_rank','faste
st_lap_rank','podium_rank',

'pole_position_rank','points_rank'])

# new_driver_name DataFrame
new_driver_name = driver_cleaned.query('id == "lewis-hamilton" or id
```

```
== "michael-schumacher" or id == "sebastian-vettel" or \
id == "max-verstappen" or id == "fernando-alonso" or id == "alain-
prost" or id == "kimi-raikkonen" or id == "ayrton-senna" \
or id == "nigel-mansell" or id == "jim-clark"')
new_driver_name
```

```
                     id                name first_name   last_name  \
10          alain-prost         Alain Prost      Alain       Prost
70         ayrton-senna        Ayrton Senna     Ayrton       Senna
280     fernando-alonso     Fernando Alonso   Fernando      Alonso
448           jim-clark           Jim Clark        Jim       Clark
537      kimi-raikkonen      Kimi Räikkönen       Kimi   Räikkönen
558      lewis-hamilton      Lewis Hamilton      Lewis    Hamilton
613      max-verstappen      Max Verstappen        Max  Verstappen
619  michael-schumacher  Michael Schumacher    Michael  Schumacher
659       nigel-mansell       Nigel Mansell      Nigel     Mansell
816    sebastian-vettel    Sebastian Vettel  Sebastian      Vettel

    abbreviation nationality_country_id  best_championship_position  \
10           PRO                 france                        1.0
70           SEN                 brazil                        1.0
280          ALO                  spain                        1.0
448          CLA         united-kingdom                        1.0
537          RAI                finland                        1.0
558          HAM         united-kingdom                        1.0
613          VER            netherlands                        1.0
619          MSC                germany                        1.0
659          MAN         united-kingdom                        1.0
816          VET                germany                        1.0

     best_starting_grid_position  best_race_result
total_championship_wins  \
10                           1.0               1.0
4
70                           1.0               1.0
3
280                          1.0               1.0
2
448                          1.0               1.0
2
537                          1.0               1.0
1
558                          1.0               1.0
7
613                          1.0               1.0
4
619                          1.0               1.0
7
659                          1.0               1.0
1
```

```
816                           1.0                1.0
4

     total_race_starts  total_race_wins  total_race_laps
total_podiums  \
10                 199               51            10540
106
70                 161               41             8219
80
280                420               32            22758
106
448                 72               25             3877
32
537                350               21            18621
103
558                374              105            21325
202
613                227               67            12329
121
619                306               91            16825
155
659                187               31             8750
59
816                299               53            16426
122

     total_points  total_pole_positions  total_fastest_laps
total_grand_slams
10          798.5                    33                  41
0
70          614.0                    65                  19
4
280        2373.0                    22                  26
0
448         274.0                    33                  28
8
537        1873.0                    18                  46
0
558        4987.5                   104                  68
6
613        3296.5                    46                  35
6
619        1566.0                    68                  77
5
659         482.0                    32                  30
4
816        3098.0                    57                  38
4
```

```
# new_seasons DataFrame
seasons_cleaned =
driver_merged.drop(columns=['name','first_name','last_name'])
new_seasons = seasons_cleaned.query('id == "lewis-hamilton" or id ==
"michael-schumacher" or id == "sebastian-vettel" or \
id == "max-verstappen" or id == "fernando-alonso" or id == "alain-
prost" or id == "kimi-raikkonen" or id == "ayrton-senna" \
or id == "nigel-mansell" or id == "jim-clark"')
new_seasons = new_seasons.drop(columns=['seasons_ranked'])
new_seasons
```

	id	seasons
10	alain-prost	13
70	ayrton-senna	11
280	fernando-alonso	22
447	jim-clark	9
536	kimi-raikkonen	19
557	lewis-hamilton	19
613	max-verstappen	12
619	michael-schumacher	19
659	nigel-mansell	15
816	sebastian-vettel	17

```
# new_races DataFrame
races_cleaned =
races_merged.drop(columns=['name','first_name','last_name','races_rank
'])
new_races = races_cleaned.query('id == "lewis-hamilton" or id ==
"michael-schumacher" or id == "sebastian-vettel" or \
id == "max-verstappen" or id == "fernando-alonso" or id == "alain-
prost" or id == "kimi-raikkonen" or id == "ayrton-senna" \
or id == "nigel-mansell" or id == "jim-clark"')
new_races
```

	id	races
10	alain-prost	202
70	ayrton-senna	162
279	fernando-alonso	422
446	jim-clark	73
535	kimi-raikkonen	353
556	lewis-hamilton	374
611	max-verstappen	230
617	michael-schumacher	308
657	nigel-mansell	191
813	sebastian-vettel	307

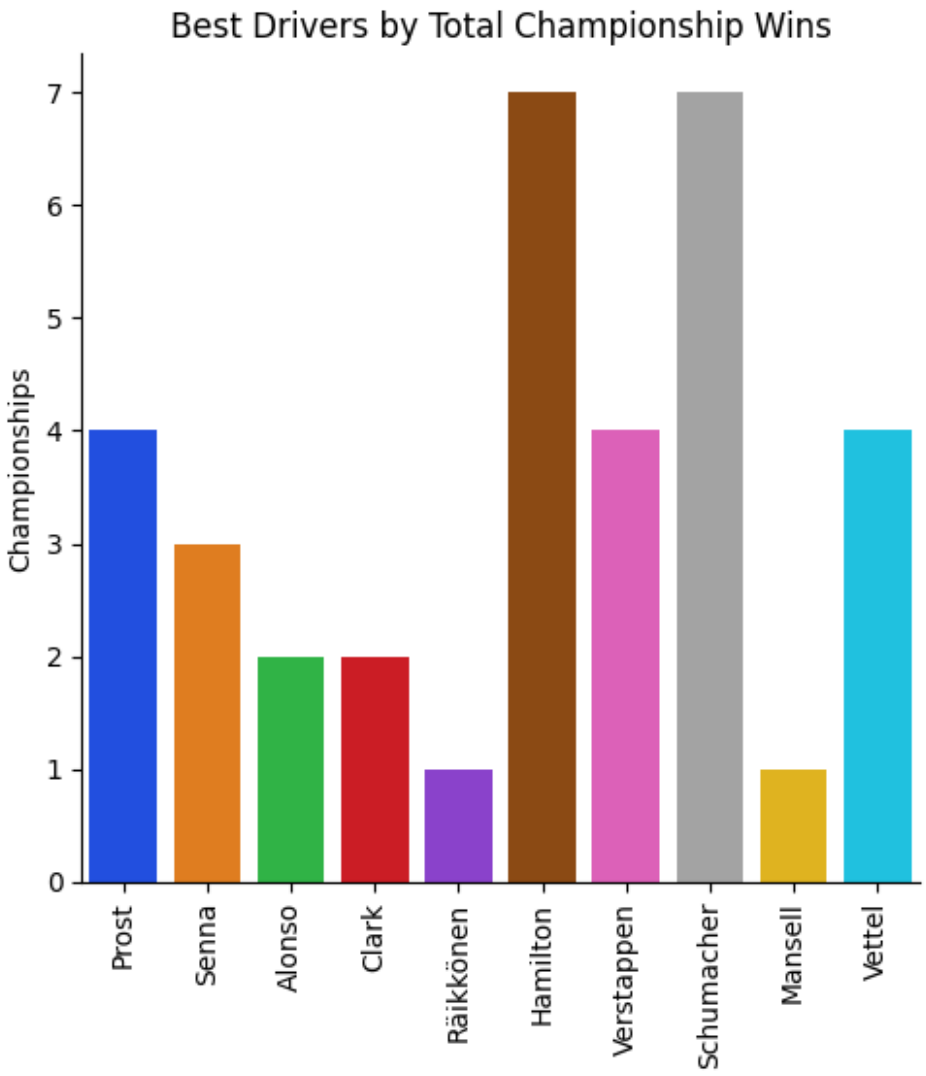
```
# top_10_drivers DataFame
name_and_seasons = new_driver_name.merge(new_seasons, on='id')
top_10_drivers = name_and_seasons.merge(new_races, on='id')
top_10_drivers
```

```
                   id                name first_name   last_name
abbreviation  \
0         alain-prost         Alain Prost      Alain       Prost
PRO
1        ayrton-senna        Ayrton Senna     Ayrton       Senna
SEN
2     fernando-alonso     Fernando Alonso   Fernando      Alonso
ALO
3           jim-clark           Jim Clark        Jim       Clark
CLA
4      kimi-raikkonen      Kimi Räikkönen       Kimi   Räikkönen
RAI
5      lewis-hamilton      Lewis Hamilton      Lewis    Hamilton
HAM
6      max-verstappen      Max Verstappen        Max  Verstappen
VER
7  michael-schumacher  Michael Schumacher    Michael  Schumacher
MSC
8       nigel-mansell       Nigel Mansell      Nigel     Mansell
MAN
9    sebastian-vettel    Sebastian Vettel  Sebastian      Vettel
VET

  nationality_country_id  best_championship_position  \
0                 france                         1.0
1                 brazil                         1.0
2                  spain                         1.0
3         united-kingdom                         1.0
4                finland                         1.0
5         united-kingdom                         1.0
6            netherlands                         1.0
7                germany                         1.0
8         united-kingdom                         1.0
9                germany                         1.0

   best_starting_grid_position  best_race_result
total_championship_wins  \
0                          1.0               1.0
4
1                          1.0               1.0
3
2                          1.0               1.0
2
3                          1.0               1.0
2
4                          1.0               1.0
1
5                          1.0               1.0
7
6                          1.0               1.0
```

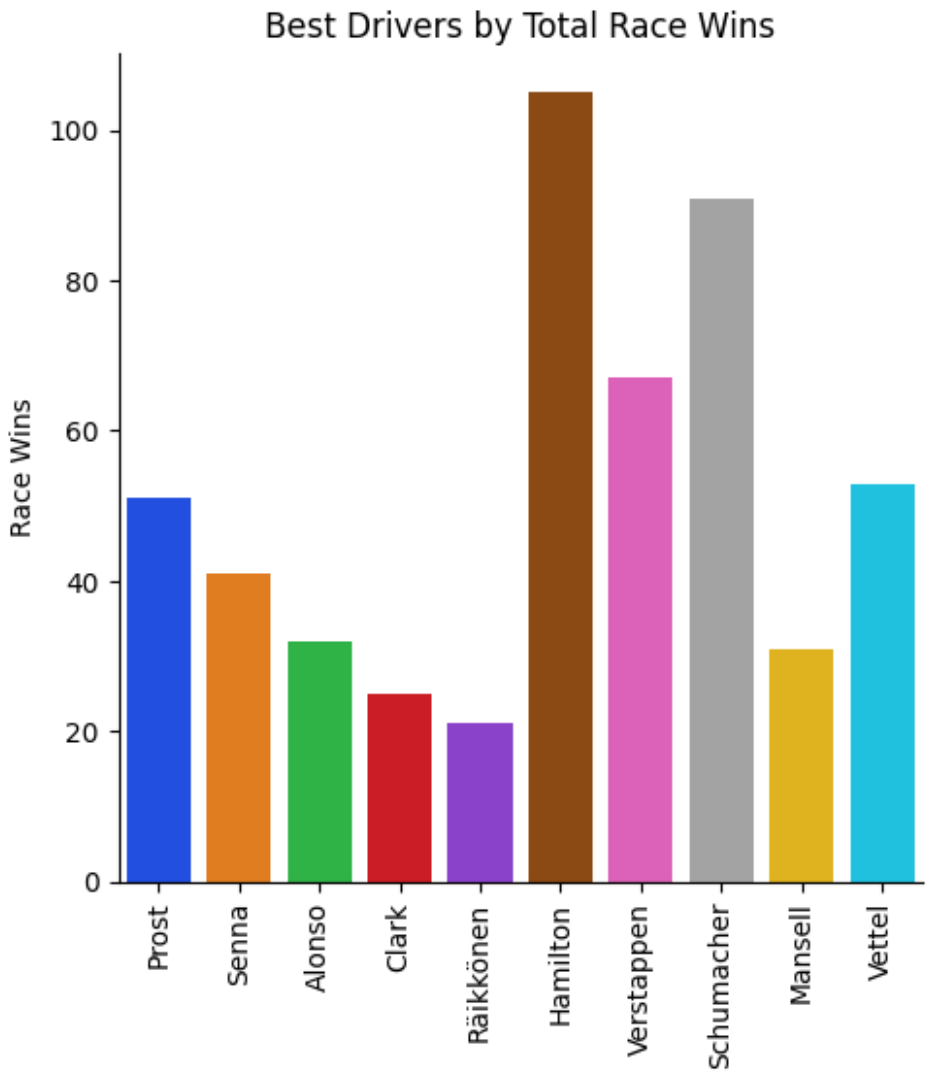
```
4
7                          1.0                1.0
7
8                          1.0                1.0
1
9                          1.0                1.0
4

   total_race_starts  total_race_wins  total_race_laps  total_podiums
\
0                199               51            10540             106

1                161               41             8219              80

2                420               32            22758             106

3                 72               25             3877              32

4                350               21            18621             103

5                374              105            21325             202

6                227               67            12329             121

7                306               91            16825             155

8                187               31             8750              59

9                299               53            16426             122


   total_points  total_pole_positions  total_fastest_laps
total_grand_slams  \
0         798.5                    33                  41
0
1         614.0                    65                  19
4
2        2373.0                    22                  26
0
3         274.0                    33                  28
8
4        1873.0                    18                  46
0
5        4987.5                   104                  68
6
6        3296.5                    46                  35
6
7        1566.0                    68                  77
5
8         482.0                    32                  30
4
```

```
9        3098.0                        57                     38
4


   seasons  races
0       13    202
1       11    162
2       22    422
3        9     73
4       19    353
5       19    374
6       12    230
7       19    308
8       15    191
9       17    307
```

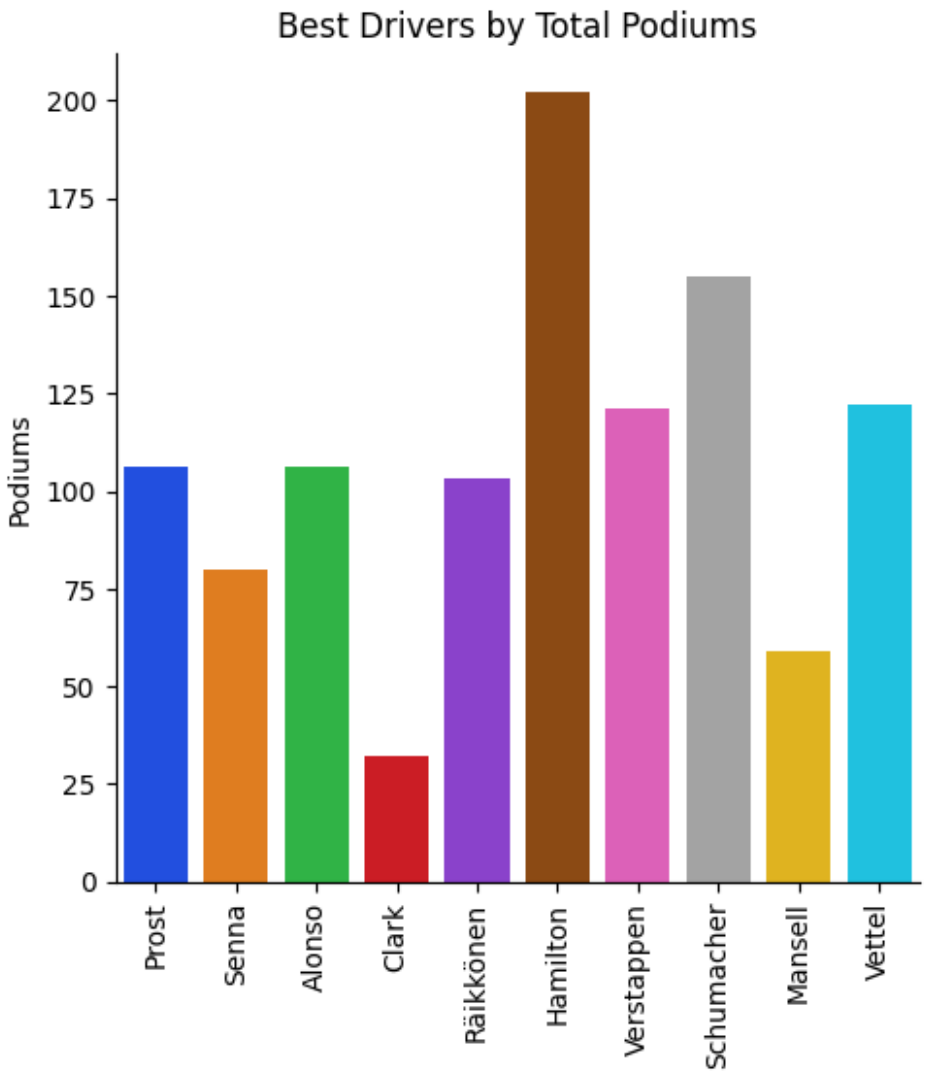
```
champ = sns.catplot(data=top_10_drivers, kind='bar', x='last_name',
y='total_championship_wins', errorbar=None,
                    hue='last_name')
for ax in champ.axes.flat:
    ax.set_title('Best Drivers by Total Championship Wins')
    ax.set_xlabel('')
    ax.set_ylabel('Championships')
    ax.tick_params('x', labelrotation=90)
```



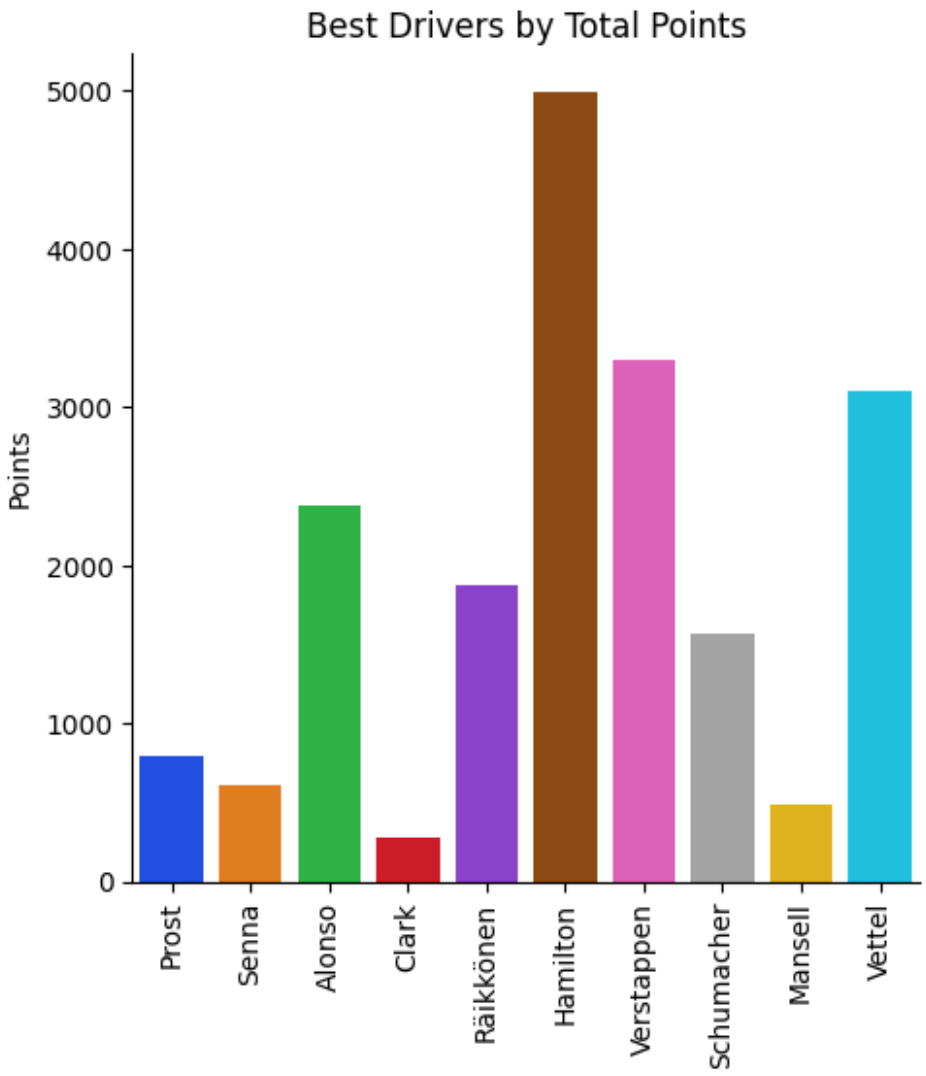

```
wins = sns.catplot(data=top_10_drivers, kind='bar', x='last_name',
y='total_race_wins', errorbar=None, hue='last_name')
for ax in wins.axes.flat:
    ax.set_title('Best Drivers by Total Race Wins')
    ax.set_xlabel('')
    ax.set_ylabel('Race Wins')
    ax.tick_params('x', labelrotation=90)
```



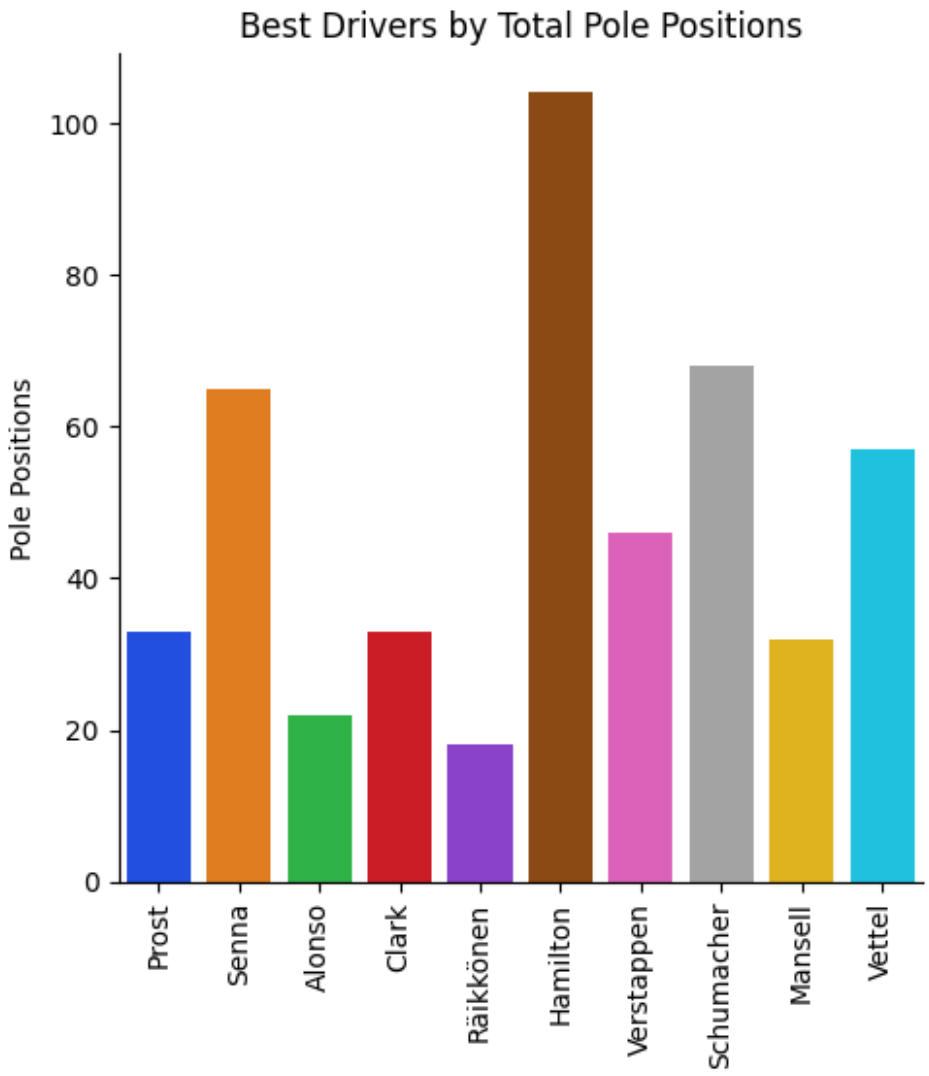

```
pods = sns.catplot(data=top_10_drivers, kind='bar', x='last_name',
y='total_podiums', errorbar=None, hue='last_name')
for ax in pods.axes.flat:
    ax.set_title('Best Drivers by Total Podiums')
    ax.set_xlabel('')
    ax.set_ylabel('Podiums')
    ax.tick_params('x', labelrotation=90)
```



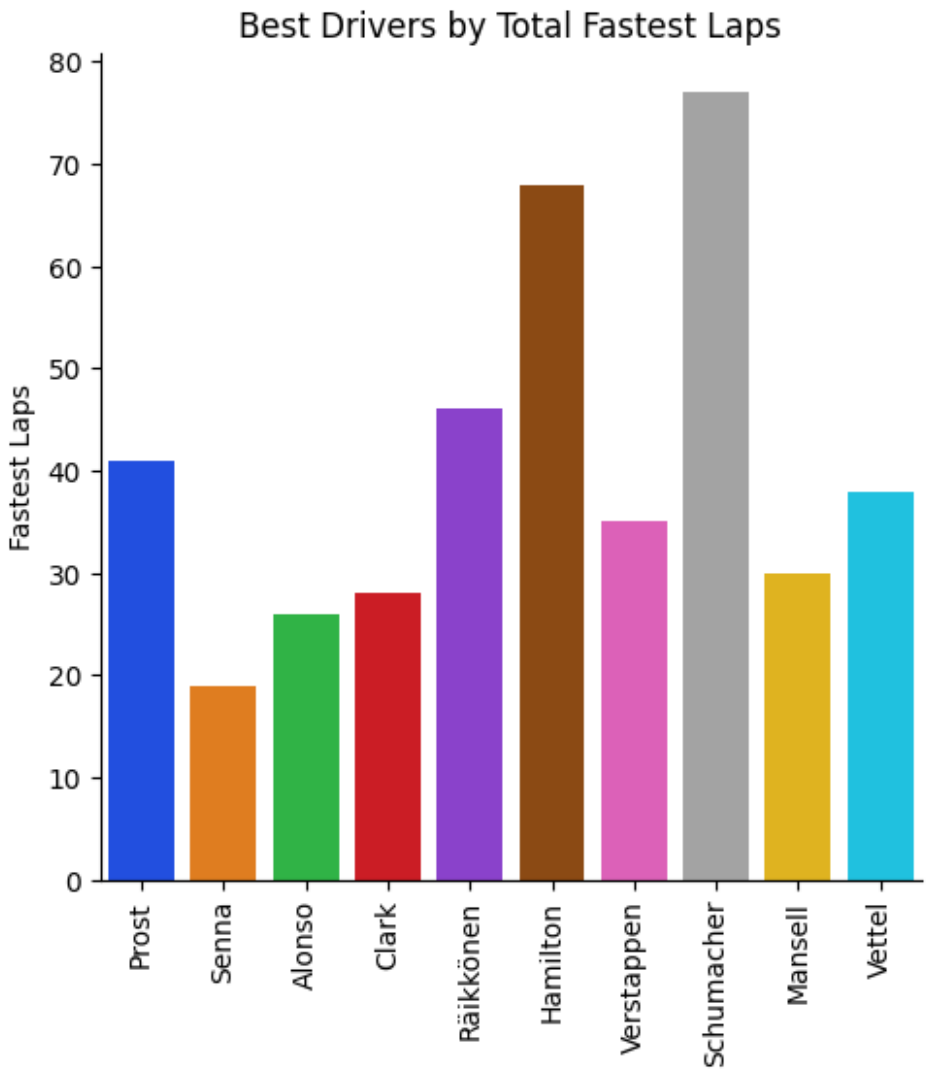

```
point = sns.catplot(data=top_10_drivers, kind='bar', x='last_name',
y='total_points', errorbar=None, hue='last_name')
for ax in point.axes.flat:
    ax.set_title('Best Drivers by Total Points')
    ax.set_xlabel('')
    ax.set_ylabel('Points')
    ax.tick_params('x', labelrotation=90)
```



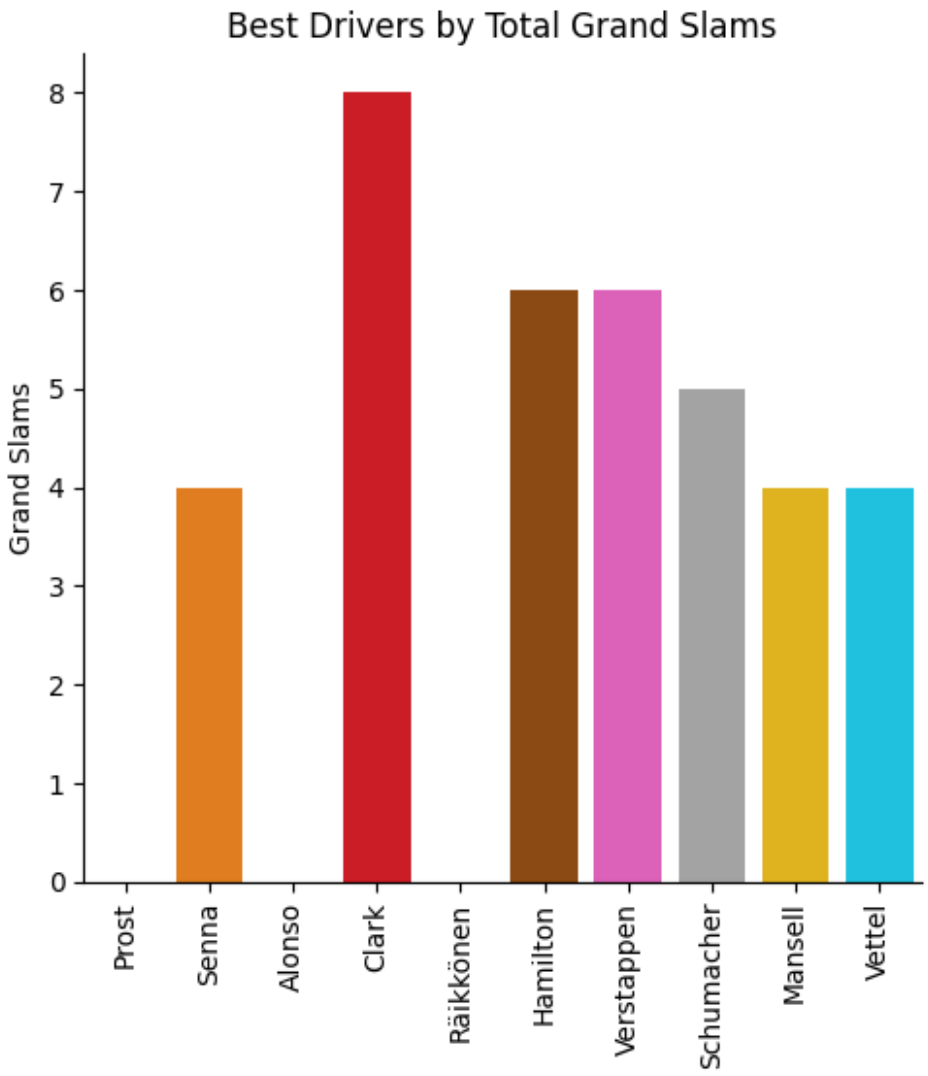

```
pole = sns.catplot(data=top_10_drivers, kind='bar', x='last_name',
y='total_pole_positions', errorbar=None, hue='last_name')
for ax in pole.axes.flat:
    ax.set_title('Best Drivers by Total Pole Positions')
    ax.set_xlabel('')
    ax.set_ylabel('Pole Positions')
    ax.tick_params('x', labelrotation=90)
```



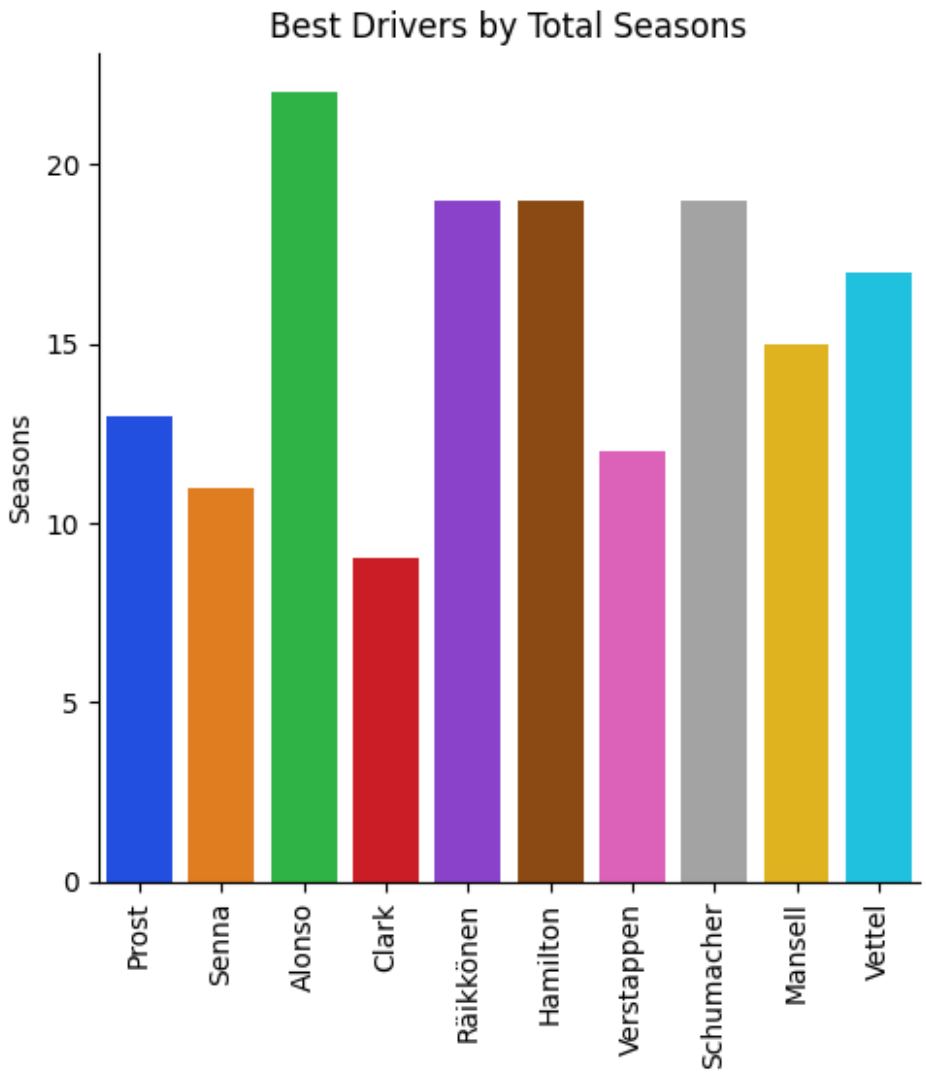

```
laps = sns.catplot(data=top_10_drivers, kind='bar', x='last_name',
y='total_fastest_laps', errorbar=None, hue='last_name')
for ax in laps.axes.flat:
    ax.set_title('Best Drivers by Total Fastest Laps')
    ax.set_xlabel('')
    ax.set_ylabel('Fastest Laps')
    ax.tick_params('x', labelrotation=90)
```



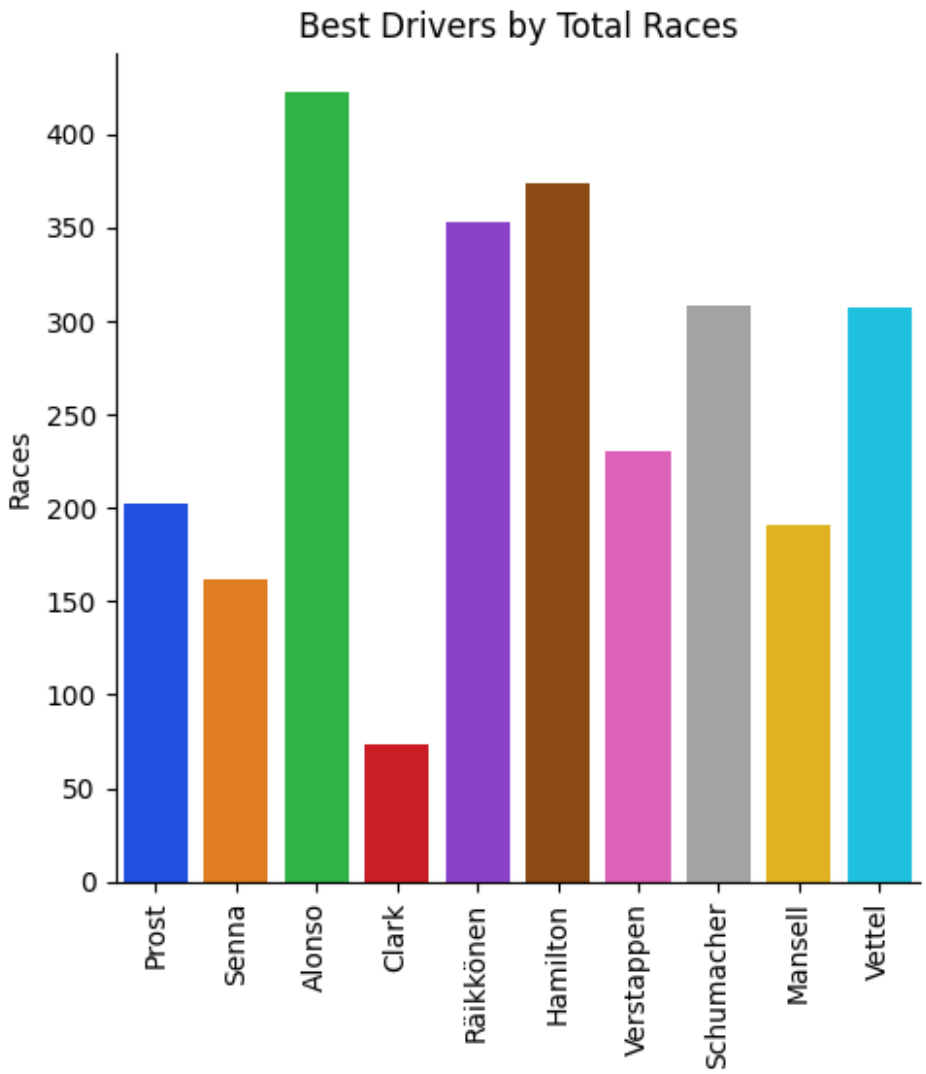

```
slam = sns.catplot(data=top_10_drivers, kind='bar', x='last_name',
y='total_grand_slams', errorbar=None, hue='last_name')
for ax in slam.axes.flat:
    ax.set_title('Best Drivers by Total Grand Slams')
    ax.set_xlabel('')
    ax.set_ylabel('Grand Slams')
    ax.tick_params('x', labelrotation=90)
```




```
sea = sns.catplot(data=top_10_drivers, kind='bar', x='last_name',
y='seasons', errorbar=None, hue='last_name')
for ax in sea.axes.flat:
    ax.set_title('Best Drivers by Total Seasons')
    ax.set_xlabel('')
    ax.set_ylabel('Seasons')
    ax.tick_params('x', labelrotation=90)
```




```
rac = sns.catplot(data=top_10_drivers, kind='bar', x='last_name',
y='races', errorbar=None, hue='last_name')
for ax in rac.axes.flat:
    ax.set_title('Best Drivers by Total Races')
    ax.set_xlabel('')
    ax.set_ylabel('Races')
    ax.tick_params('x', labelrotation=90)
```


Best Drivers by Total Races
Races
0
50
100
150
200
250
300
350
400
Prost
Senna
Alonso
Clark
Räikkönen
Hamilton
Verstappen
Schumacher
Mansell
Vettel