```python
In [1]: import pandas as pd
```

```python
In [3]: c
```

```
In [4]: df
```

	Unnamed: 0	year	make	model	trim	body	transmission	
0	0	2015	Kia	sorento	LX	suv	automatic	5xyktca69f
1	1	2015	Kia	sorento	LX	suv	automatic	5xyktca69f
2	2	2015	Volvo	s60	T5	sedan	automatic	yv1612tb4f
3	3	2015	Nissan	altima	2.5 S	sedan	automatic	1n4al3ap1f
4	4	2015	Kia	optima	LX	sedan	automatic	5xxgm4a73f
...	...	...	...	...	...	...	...	
188670	188670	2013	Honda	civic	LX PZEV	sedan	automatic	2hgfb2f54d
188671	188671	2013	Hyundai	sonata	GLS	sedan	NaN	5npeb4ac6d
188672	188672	2013	Mercedes-Benz	g-class	G63 AMG	suv	automatic	wdcyc7df4d
188673	188673	2013	Chevrolet	silverado 1500	LT	crew cab	automatic	3gcpcse0xd
188674	188674	2013	Audi	s5	Premium Plus quattro	convertible	automatic	waucgafh6d

188675 rows × 17 columns

```
In [5]: df['model'].nunique()

Out[5]: 378

In [6]: df['model']=df['model'].str.lower()

In [7]: df['model'].nunique()

Out[7]: 378

In [8]: df['body'].nunique()

Out[8]: 37

In [9]: df['body']=df['body'].str.lower()

In [10]: df['body'].nunique()

Out[10]: 37

In [11]: df.isnull().sum()

Out[11]: Unnamed: 0          0
         year                0
         make              764
         model             862
         trim              766
         body              875
         transmission    22038
         vin                 4
         state               0
         condition         781
         odometer            4
         color             351
         interior          351
         seller              0
         mmr                36
         sellingprice       10
         saledate           10
         dtype: int64

In [12]: df['make']=df['make'].replace(" ","0")
```

```
In [13]: df.isnull().sum()
```

Out[13]: Unnamed: 0   0
         year   0
         make   764
         model   862
         trim   766
         body   875
         transmission   22038
         vin   4
         state   0
         condition   781
         odometer   4
         color   351
         interior   351
         seller   0
         mmr   36
         sellingprice   10
         saledate   10
         dtype: int64

```
In [14]: df.isnull().sum()
```

Out[14]: Unnamed: 0   0
         year   0
         make   764
         model   862
         trim   766
         body   875
         transmission   22038
         vin   4
         state   0
         condition   781
         odometer   4
         color   351
         interior   351
         seller   0
         mmr   36
         sellingprice   10
         saledate   10
         dtype: int64

```
In [15]: df.isnull().sum()
```

```
Out[15]: Unnamed: 0           0
         year                0
         make              764
         model             862
         trim              766
         body              875
         transmission    22038
         vin                 4
         state               0
         condition         781
         odometer            4
         color             351
         interior          351
         seller              0
         mmr                36
         sellingprice       10
         saledate           10
         dtype: int64
```

```
In [16]: df['model']=df['model'].replace("na","0")
```

```
In [17]: df.isnull().sum()
```

```
Out[17]: Unnamed: 0           0
         year                0
         make              764
         model             862
         trim              766
         body              875
         transmission    22038
         vin                 4
         state               0
         condition         781
         odometer            4
         color             351
         interior          351
         seller              0
         mmr                36
         sellingprice       10
         saledate           10
         dtype: int64
```

```
In [18]: df['make'].value_counts().sum()
```

```
Out[18]: 187911
```

```
In [19]: df.shape
```

```
Out[19]: (188675, 17)
```

```
In [20]: df['model'].value_counts().sum()
```

```
Out[20]: 187813
```

```
In [ ]:
```

```
In [21]: df['make'].unique()
```

```
Out[21]: array(['Kia', 'Volvo', 'Nissan', 'Ford', 'Hyundai', 'Chevrolet', 'Audi',
                 'Lexus', 'chevrolet', 'BMW', 'Buick', 'Chrysler', 'GMC', 'Mazda',
                 'Jeep', 'Mitsubishi', 'Dodge', 'Honda', 'Subaru', 'Mercedes-Benz',
                 'Volkswagen', 'Acura', 'Porsche', 'Jaguar', 'Cadillac', nan,
                 'Toyota', 'Lincoln', 'Scion', 'MINI', 'smart', 'FIAT', 'Ram',
                 'Land Rover', 'Infiniti', 'dodge', 'lincoln', 'Maserati', 'buick',
                 'jeep', 'vw', 'land rover', 'volkswagen', 'Tesla', 'Bentley',
                 'nissan', 'Suzuki', 'Rolls-Royce'], dtype=object)
```

```
In [22]: df.head()
```

Out[22]:

	Unnamed: 0	year	make	model	trim	body	transmission	vin	state	co
0	0	2015	Kia	sorento	LX	suv	automatic	5xyktca69fg566472	ca	
1	1	2015	Kia	sorento	LX	suv	automatic	5xyktca69fg561319	ca	
2	2	2015	Volvo	s60	T5	sedan	automatic	yv1612tb4f1310987	ca	
3	3	2015	Nissan	altima	2.5 S	sedan	automatic	1n4al3ap1fn326013	ca	
4	4	2015	Kia	optima	LX	sedan	automatic	5xxgm4a73fg353538	ca	

```
In [23]: df[df['seller']=='the hertz corporation']
```

Out[23]:

	Unnamed: 0	year	make	model	trim	body	transmission	
4582	4582	2015	Kia	sorento	LX	suv	automatic	5xyktca68fg
7961	7961	2015	Mercedes-Benz	gl-class	GL450 4MATIC	suv	automatic	4jgdf6ee1fa
8064	8064	2015	Infiniti	qx60	Base	suv	automatic	5n1al0mm1fc
9439	9439	2014	BMW	m5	Base	sedan	automatic	wbsfv9c51ed
9447	9447	2014	BMW	6 series	650i	convertible	automatic	wbayp9c53ed
...	...	...	...	...	...	...	...	
188515	188515	2013	Hyundai	elantra	GLS	sedan	NaN	5npdh4ae7dh
188518	188518	2013	Kia	optima	LX	sedan	NaN	5xxgm4a70dg
188543	188543	2013	Dodge	charger	SE	sedan	NaN	2c3cdxbgxdh
188558	188558	2013	Hyundai	elantra	GLS	sedan	automatic	5npdh4ae9dh

	Unnamed: 0	year	make	model	trim	body	transmission	
188577	188577	2013	Toyota	camry	LE	sedan	NaN	4t1bf1fk6du2

15306 rows × 17 columns

In [24]: `df['seller'].value_counts()`

Out[24]:
```
the hertz corporation           15306
avis corporation                12381
ford motor credit company llc   10469
enterprise veh exchange/rental   6598
avis budget group                4637
                                 ...
nissan of south holland             1
tropical chevrolet                  1
robertson auto                      1
alan jay chevrolet cadillac inc     1
maserati north america inc          1
Name: seller, Length: 5262, dtype: int64
```

```
In [25]: df[(df['seller']=='the hertz corporation') & (df['make']=='Kia') & (df['bod
```

	Unnamed: 0	year	make	model	trim	body	transmission	vin	sta
4582	4582	2015	Kia	sorento	LX	suv	automatic	5xyktca68fg565037	r
12152	12152	2014	Kia	sorento	LX	suv	automatic	5xyktca67eg446409	a
16460	16460	2014	Kia	sorento	LX	suv	automatic	5xyktca69eg465561	
16476	16476	2014	Kia	sorento	LX	suv	automatic	5xyktca60eg440113	g
19473	19473	2014	Kia	sorento	LX	suv	automatic	5xyktca64eg476709	c
...	...	...	...	...	...	...	...	...	
177217	177217	2013	Kia	sorento	LX	suv	automatic	5xyktda21dg368338	
179803	179803	2013	Kia	sportage	LX	suv	automatic	kndpbca21d7429333	m
180923	180923	2013	Kia	sportage	Base	suv	automatic	kndpb3a24d7398806	
183863	183863	2013	Kia	sportage	LX	suv	NaN	kndpb3a29d7445750	p

	Unnamed: 0	year	make	model	trim	body	transmission	vin	stat
186616	186616	2013	Kia	sportage	LX	suv	automatic	kndpbca28d7445349	

182 rows × 17 columns

```
In [26]: df[(df['seller']=='the hertz corporation') & (df['make']=='Kia') & (df['bod
```

Out[26]:

	Unnamed: 0	year	make	model	trim	body	transmission	vin	sta
4582	4582	2015	Kia	sorento	LX	suv	automatic	5xyktca68fg565037	r
12152	12152	2014	Kia	sorento	LX	suv	automatic	5xyktca67eg446409	a
16460	16460	2014	Kia	sorento	LX	suv	automatic	5xyktca69eg465561	
16476	16476	2014	Kia	sorento	LX	suv	automatic	5xyktca60eg440113	g
19473	19473	2014	Kia	sorento	LX	suv	automatic	5xyktca64eg476709	c
...	...	...	...	...	...	...	...	...	
176925	176925	2013	Kia	sorento	LX	suv	automatic	5xyktda29dg391270	a
177217	177217	2013	Kia	sorento	LX	suv	automatic	5xyktda21dg368338	
179803	179803	2013	Kia	sportage	LX	suv	automatic	kndpbca21d7429333	m
180923	180923	2013	Kia	sportage	Base	suv	automatic	kndpb3a24d7398806	

	Unnamed: 0	year	make	model	trim	body	transmission	vin	stat
186616	186616	2013	Kia	sportage	LX	suv	automatic	kndpbca28d7445349	

166 rows × 17 columns

In [27]: `df.sample(2)`

Out[27]:

	Unnamed: 0	year	make	model	trim	body	transmission	vin
41265	41265	2014	Dodge	grand caravan	SE	minivan	NaN	2c4rdgbg7er223177
53657	53657	2014	Audi	allroad	Premium Plus quattro	wagon	automatic	wa1ufafl7ea088032

```python
In [28]: df[(df['seller']=='the hertz corporation') & (df['make']=='Kia') & (df['bod
```

Out[28]:

	Unnamed: 0	year	make	model	trim	body	transmission	vin	state
4582	4582	2015	Kia	sorento	LX	suv	automatic	5xyktca68fg565037	n
12152	12152	2014	Kia	sorento	LX	suv	automatic	5xyktca67eg446409	a
16460	16460	2014	Kia	sorento	LX	suv	automatic	5xyktca69eg465561	t
16476	16476	2014	Kia	sorento	LX	suv	automatic	5xyktca60eg440113	g
19473	19473	2014	Kia	sorento	LX	suv	automatic	5xyktca64eg476709	c
...	...	...	...	...	...	...	...	...	..
176925	176925	2013	Kia	sorento	LX	suv	automatic	5xyktda29dg391270	a
177217	177217	2013	Kia	sorento	LX	suv	automatic	5xyktda21dg368338	t
179803	179803	2013	Kia	sportage	LX	suv	automatic	kndpbca21d7429333	m
183863	183863	2013	Kia	sportage	LX	suv	NaN	kndpb3a29d7445750	p

	Unnamed: 0	year	make	model	trim	body	transmission	vin	state
186616	186616	2013	Kia	sportage	LX	suv	automatic	kndpbca28d7445349	r

172 rows × 17 columns

```
In [29]: def car(sell,maker,body):
             data=df[(df['seller']==sell) & (df['make']==maker) & (df['body']==body)
             return data
```

```
In [30]: car('avis budget group','Ford','sedan')#1845
```

	Unnamed: 0	year	make	model	trim	body	transmission	vin	stat
1093	1093	2015	Ford	taurus	Limited	sedan	automatic	1fahp2f88fg100893	m
1506	1506	2015	Ford	taurus	Limited	sedan	automatic	1fahp2f89fg103768	
1662	1662	2015	Ford	taurus	Limited	sedan	automatic	1fahp2f89fg102698	
3346	3346	2015	Ford	taurus	Limited	sedan	automatic	1fahp2f87fg101162	
4199	4199	2015	Ford	taurus	Limited	sedan	automatic	1fahp2f80fg103609	g
...	...	...	...	...	...	...	...	...	
123289	123289	2013	Ford	fusion	SE	sedan	automatic	3fa6p0hr0dr257499	m
126818	126818	2013	Ford	fusion	SE	sedan	automatic	3fa6p0h76dr245260	m
128146	128146	2013	Ford	fusion	SE	sedan	automatic	3fa6p0hrxdr280546	p
131059	131059	2013	Ford	fusion	SE	sedan	automatic	3fa6p0h70dr280716	m

	Unnamed: 0	year	make	model	trim	body	transmission	vin	stat
135229	135229	2013	Ford	fusion	SE	sedan	automatic	3fa6p0hr5dr223171	p

1845 rows × 17 columns

In [31]: `df.sample(5)`

Out[31]:

	Unnamed: 0	year	make	model	trim	body	transmission	v
71077	71077	2014	Hyundai	elantra	SE	sedan	automatic	5npdh4ae3eh5081
166040	166040	2013	Chevrolet	tahoe	LTZ	suv	automatic	1gnskce01dr2727
104171	104171	2013	Ford	fusion	Titanium	sedan	automatic	3fa6p0k95dr1201
178127	178127	2013	Volkswagen	jetta	TDI	sedan	manual	3vw3l7aj8dm4197
102104	102104	2013	Volkswagen	passat	SE	sedan	automatic	1vwbh7a36dc1196

```
In [32]: car('avis budget group','Ford','suv')#1260
```

	Unnamed: 0	year	make	model	trim	body	transmission	vin	st
10952	10952	2014	Ford	escape	SE	suv	automatic	1fmcu9g93eua07238	
10953	10953	2014	Ford	escape	SE	suv	automatic	1fmcu9g95eua07239	
10957	10957	2014	Ford	escape	SE	suv	automatic	1fmcu9g98eua07543	
10961	10961	2014	Ford	escape	SE	suv	automatic	1fmcu9g90eua07522	
10962	10962	2014	Ford	escape	SE	suv	automatic	1fmcu9g97eua15603	
...	...	...	...	...	...	...	...	...	
100176	100176	2013	Ford	escape	SE	suv	automatic	1fmcu0g9xduc26627	
108840	108840	2013	Ford	edge	Limited	suv	automatic	2fmdk4kc0dbc46718	
112507	112507	2013	Ford	escape	SEL	suv	automatic	1fmcu9h95dua74887	
125998	125998	2013	Ford	escape	SEL	suv	automatic	1fmcu9h97dua35766	

	Unnamed: 0	year	make	model	trim	body	transmission	vin	st
178312	178312	2013	Ford	explorer	Limited	suv	automatic	1fm5k7f81dgc35604	

1260 rows × 17 columns

```python
In [33]: car('avis budget group','Ford','van')#346
```

	Unnamed: 0	year	make	model	trim	body	transmission	vin	state
10861	10861	2014	Ford	e-series wagon	E-350 Super Duty XLT	van	NaN	1fbne3bl8eda97999	mn
10864	10864	2014	Ford	e-series wagon	E-350 Super Duty XLT	van	automatic	1fbne3bl1eda97861	il
10902	10902	2014	Ford	e-series wagon	E-350 Super Duty XLT	van	automatic	1fbne3bl8eda82385	tx
10912	10912	2014	Ford	e-series wagon	E-350 Super Duty XLT	van	automatic	1fbne3bl7eda98089	mo
10925	10925	2014	Ford	e-series wagon	E-350 Super Duty XLT	van	automatic	1fbne3bl6edb01029	mo
...	...	...	...	...	...	...	...	...	...
89084	89084	2014	Ford	e-series wagon	E-350 Super Duty XLT	van	NaN	1fbne3blxeda77737	tx
89087	89087	2014	Ford	e-series wagon	E-350 Super Duty XLT	van	NaN	1fbne3bl3eda77790	tx
89089	89089	2014	Ford	e-series wagon	E-350 Super Duty XLT	van	automatic	1fbne3bl0edb01706	tx
89095	89095	2014	Ford	e-series wagon	E-350 Super Duty XLT	van	automatic	1fbne3bl3eda22126	wa

	Unnamed: 0	year	make	model	trim	body	transmission	vin	state
92653	92653	2013	Ford	e-series wagon	E-350 Super Duty XL	van	automatic	1fbne3bl2dda84342	wa

346 rows × 17 columns

In [34]: `df.sample(5)`

Out[34]:

	Unnamed: 0	year	make	model	trim	body	transmission	
159004	159004	2013	Lincoln	mkz	Base	sedan	automatic	3ln6l2j94dr825
67854	67854	2014	Dodge	grand caravan	SXT	minivan	automatic	2c4rdgcg3er210
13679	13679	2014	Kia	optima	LX	sedan	NaN	5xxgm4a76eg320
161818	161818	2013	Mercedes-Benz	c-class	C250 Sport	sedan	automatic	wddgf4hb5dr250
130938	130938	2013	Ford	f-150	XLT	supercrew	automatic	1ftfw1et8dfb07

In [35]: `type('year')`

Out[35]: str

```python
In [36]: df[(df['year']==2013) & (df['make']=='Kia') &(df['body']=='suv')]#496
```

Out[36]:

	Unnamed: 0	year	make	model	trim	body	transmission	vin	stat
90765	90765	2013	Kia	sorento	LX	suv	automatic	5xyktda2xdg322880	c
90782	90782	2013	Kia	sorento	SX	suv	automatic	5xykw4a26dg339716	c
90836	90836	2013	Kia	sportage	LX	suv	automatic	kndpbca25d7406217	c
90866	90866	2013	Kia	sportage	LX	suv	automatic	kndpb3a28d7450308	c
90873	90873	2013	Kia	sorento	EX	suv	automatic	5xyku3a23dg334585	c
...	...	...	...	...	...	...	...	...	.
188345	188345	2013	Kia	sorento	LX	suv	automatic	5xykt4a69dg393264	g
188524	188524	2013	Kia	sorento	EX	suv	automatic	5xyku4a68dg385153	p
188603	188603	2013	Kia	sorento	LX	suv	NaN	5xykt4a60dg386378	p
188632	188632	2013	Kia	sorento	LX	suv	NaN	5xyktda61dg387930	p

	Unnamed: 0	year	make	model	trim	body	transmission	vin	stat
188633	188633	2013	Kia	sportage	EX	suv	NaN	kndpcca25d7358327	pa

496 rows × 17 columns

```python
df[(df['year']==2013) & (df['make']=='Ford') &(df['body']=='suv')]#9054
```

	Unnamed: 0	year	make	model	trim	body	transmission	vin
91224	91224	2013	Ford	edge	Limited	suv	automatic	2fmdk4kc0dbc38196
91231	91231	2013	Ford	edge	Limited	suv	automatic	2fmdk4kcxdbc18652
91235	91235	2013	Ford	edge	SEL	suv	automatic	2fmdk3jc0dbb22024
91238	91238	2013	Ford	edge	SEL	suv	automatic	2fmdk3jc4dbb01774
91246	91246	2013	Ford	escape	SEL	suv	automatic	1fmcu9hx7dub32111
...	...	...	...	...	...	...	...	...
188621	188621	2013	Ford	explorer	Sport	suv	NaN	1fm5k8gt1dgb60167
188641	188641	2013	Ford	edge	SE	suv	automatic	2fmdk3g99dbc41783
188649	188649	2013	Ford	edge	Limited	suv	automatic	2fmdk4kc7dbc22349
188657	188657	2013	Ford	expedition	King Ranch	suv	NaN	1fmju1j56def16232

	Unnamed: 0	year	make	model	trim	body	transmission	vin
188658	188658	2013	Ford	explorer	XLT	suv	automatic	1fm5k7d81dgc43382

9054 rows × 17 columns

```
In [38]: def year_make_body(year,maker,body):
             data=df[(df['year']==year) & (df['make']==maker) &(df['body']==body)]
             return data
```

```
In [39]: year_make_body(2015,'Toyota','sedan').shape#159
```

```
Out[39]: (159, 17)
```

```
In [40]: df['year'].value_counts()
```

```
Out[40]: 2013    98168
         2014    81070
         2015     9437
         Name: year, dtype: int64
```

```
In [41]: make_2013= df['year']==2013
```

```
In [ ]:
```

```
In [42]: df.shape
```

```
Out[42]: (188675, 17)
```

```
In [43]: df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 188675 entries, 0 to 188674
Data columns (total 17 columns):
 #   Column        Non-Null Count   Dtype
---  ------        --------------   -----
 0   Unnamed: 0    188675 non-null  int64
 1   year          188675 non-null  int64
 2   make          187911 non-null  object
 3   model         187813 non-null  object
 4   trim          187909 non-null  object
 5   body          187800 non-null  object
 6   transmission  166637 non-null  object
 7   vin           188671 non-null  object
 8   state         188675 non-null  object
 9   condition     187894 non-null  float64
 10  odometer      188671 non-null  float64
 11  color         188324 non-null  object
 12  interior      188324 non-null  object
 13  seller        188675 non-null  object
 14  mmr           188639 non-null  float64
 15  sellingprice  188665 non-null  float64
 16  saledate      188665 non-null  object
dtypes: float64(4), int64(2), object(11)
memory usage: 16.6+ MB
```

```
In [44]: df['make'].value_counts()
```

```
Out[44]: Ford            42819
         Chevrolet       21688
         Nissan          18001
         Dodge           12911
         Toyota          12756
         Hyundai         10969
         Kia             10699
         Chrysler         8103
         Infiniti         5256
         Jeep             4510
         Mercedes-Benz    4289
         BMW              4151
         Honda            3820
         Volkswagen       3708
         Lexus            2781
         Mazda            2672
         Ram              2668
         GMC              2545
         Subaru           2345
         Lincoln          2086
         Mitsubishi       1379
         Audi             1286
         Buick            1128
         Cadillac          962
         Volvo             916
         MINI              663
         FIAT              630
         Acura             498
         Scion             433
         Porsche           366
         Land Rover        362
         Jaguar            147
         smart             133
         Suzuki             52
         dodge              41
         Maserati           31
         jeep               27
         Tesla              23
         lincoln            18
         vw                 13
         Bentley            13
         volkswagen          4
         chevrolet           3
         buick               3
         land rover          1
         nissan              1
         Rolls-Royce         1
         Name: make, dtype: int64
```

```
In [45]: ford=df[df['make']=='Ford']
```

```
In [46]: s=df.groupby('make')['body']
```

```
In [47]: s.min()#min making car brand in body type    ex -- acura making body type se

Out[47]: make
         Acura                      sedan
         Audi                 convertible
         BMW                  convertible
         Bentley              convertible
         Buick                      sedan
         Cadillac                   coupe
         Chevrolet            convertible
         Chrysler             convertible
         Dodge                      coupe
         FIAT                 convertible
         Ford                 convertible
         GMC                     crew cab
         Honda                      coupe
         Hyundai            elantra coupe
         Infiniti           g convertible
         Jaguar               convertible
         Jeep                         suv
         Kia                    hatchback
         Land Rover                   suv
         Lexus                convertible
         Lincoln                    sedan
         MINI                 convertible
         Maserati                   coupe
         Mazda                convertible
         Mercedes-Benz        convertible
         Mitsubishi             hatchback
         Nissan               convertible
         Porsche              convertible
         Ram                     crew cab
         Rolls-Royce                sedan
         Scion                      coupe
         Subaru                     coupe
         Suzuki                 hatchback
         Tesla                      sedan
         Toyota                access cab
         Volkswagen     beetle convertible
         Volvo                convertible
         buick                        NaN
         chevrolet                    NaN
         dodge                        NaN
         jeep                         NaN
         land rover                   NaN
         lincoln                      NaN
         nissan                       NaN
         smart                convertible
         volkswagen                   NaN
         vw                           NaN
         Name: body, dtype: object
```

```python
In [48]: def maker_body(makers,body):
             data = df[(df['make']==makers) & (df['body']==body)]
             return data
         maker_body('Kia','hatchback')
```

	Unnamed: 0	year	make	model	trim	body	transmission	vin
9778	9778	2014	Kia	forte	Forte5 EX	hatchback	automatic	knafx5a8xe5232667
15180	15180	2014	Kia	rio	LX	hatchback	manual	knadm5a39e6372062
17889	17889	2014	Kia	rio	LX	hatchback	automatic	knadm5a35e6351855
19471	19471	2014	Kia	rio	LX	hatchback	automatic	knadm5a33e6352406
23843	23843	2014	Kia	rio	LX	hatchback	automatic	knadm5a31e6355448
...	...	...	...	...	...	...	...	...
183744	183744	2013	Kia	rio	LX	hatchback	automatic	knadm5a3xd6208396
186564	186564	2013	Kia	rio	LX	hatchback	automatic	knadm5a3xd6205420
186571	186571	2013	Kia	rio	LX	hatchback	automatic	knadm5a36d6307085
186595	186595	2013	Kia	forte	EX	hatchback	automatic	knafu5a20d5689281
187459	187459	2013	Kia	rio	LX	hatchback	automatic	knadm5a32d6223426

153 rows × 17 columns

```
In [49]: s.max()#max making car brand in body type   ex -- acura making body type ts
```

```
Out[49]: make
         Acura              tsx sport wagon
         Audi                         wagon
         BMW                          wagon
         Bentley                      sedan
         Buick                          suv
         Cadillac                       suv
         Chevrolet                      van
         Chrysler                     sedan
         Dodge                          suv
         FIAT                         wagon
         Ford                         wagon
         GMC                            van
         Honda                          suv
         Hyundai                        suv
         Infiniti                       suv
         Jaguar                       sedan
         Jeep                           suv
         Kia                          wagon
         Land Rover                     suv
         Lexus                          suv
         Lincoln                      wagon
         MINI                         wagon
         Maserati                     sedan
         Mazda                          suv
         Mercedes-Benz                wagon
         Mitsubishi                     suv
         Nissan                       wagon
         Porsche                        suv
         Ram                    regular cab
         Rolls-Royce                  sedan
         Scion                        wagon
         Subaru                       wagon
         Suzuki                         suv
         Tesla                        sedan
         Toyota                       wagon
         Volkswagen                   wagon
         Volvo                        wagon
         buick                          NaN
         chevrolet                      NaN
         dodge                          NaN
         jeep                           NaN
         land rover                     NaN
         lincoln                        NaN
         nissan                         NaN
         smart                    hatchback
         volkswagen                     NaN
         vw                             NaN
         Name: body, dtype: object
```

```python
maker_body('Kia','suv')#1837
```

Out[51]:

	Unnamed: 0	year	make	model	trim	body	transmission	vin	state
0	0	2015	Kia	sorento	LX	suv	automatic	5xyktca69fg566472	ca
1	1	2015	Kia	sorento	LX	suv	automatic	5xyktca69fg561319	ca
6	6	2015	Kia	sorento	LX	suv	automatic	5xyktca66fg561407	ca
14	14	2015	Kia	sorento	LX	suv	automatic	5xyktca60fg565226	ca
15	15	2015	Kia	sorento	LX	suv	automatic	5xyktca68fg559481	ca
...	...	...	...	...	...	...	...	...	..
188345	188345	2013	Kia	sorento	LX	suv	automatic	5xykt4a69dg393264	ga
188524	188524	2013	Kia	sorento	EX	suv	automatic	5xyku4a68dg385153	pa
188603	188603	2013	Kia	sorento	LX	suv	NaN	5xykt4a60dg386378	pa
188632	188632	2013	Kia	sorento	LX	suv	NaN	5xyktda61dg387930	pa
188633	188633	2013	Kia	sportage	EX	suv	NaN	kndpcca25d7358327	pa

2669 rows × 17 columns

In [52]: `df['make'].value_counts()#jeep 10`

Out[52]:
```
Ford              42819
Chevrolet         21688
Nissan            18001
Dodge             12911
Toyota            12756
Hyundai           10969
Kia               10699
Chrysler           8103
Infiniti           5256
Jeep               4510
Mercedes-Benz      4289
BMW                4151
Honda              3820
Volkswagen         3708
Lexus              2781
Mazda              2672
Ram                2668
GMC                2545
Subaru             2345
Lincoln            2086
Mitsubishi         1379
Audi               1286
Buick              1128
Cadillac            962
Volvo               916
MINI                663
FIAT                630
Acura               498
Scion               433
Porsche             366
Land Rover          362
Jaguar              147
smart               133
Suzuki               52
dodge                41
Maserati             31
jeep                 27
Tesla                23
lincoln              18
vw                   13
Bentley              13
volkswagen            4
chevrolet             3
buick                 3
land rover            1
nissan                1
Rolls-Royce           1
Name: make, dtype: int64
```

```
In [53]: makers
         Ford            42819
         Chevrolet       21688
         Nissan          18001
         Dodge           12911
         Toyota          12756
         Hyundai         10969
         Kia             10699
         Chrysler         8103
         Infiniti         5256
         Jeep             4510


         body

         sedan                    89020
         suv                      45799
         hatchback                10588
         minivan                  10329
         wagon                     4883
```

  Input In [53]
    Ford   42819
                     ^
SyntaxError: invalid syntax
```

```
In [54]: maker_body('Ford','sedan').shape

Out[54]: (13991, 17)
```

```
In [55]: maker_body('Chevrolet','suv').shape

Out[55]: (5083, 17)
```

```
In [56]: maker_body('Nissan','suv').shape

Out[56]: (3200, 17)
```

```
In [57]: maker_body('Toyota','suv').shape

Out[57]: (1523, 17)
```

```
In [58]: maker_body('Hyundai','suv').shape

Out[58]: (968, 17)
```

```
In [59]: maker_body('Kia','suv').shape

Out[59]: (2669, 17)
```

```
In [60]: maker_body('Infiniti','suv').shape

Out[60]: (895, 17)
```

```
In [61]: maker_body('Jeep','suv').shape
```

Out[61]: (4510, 17)

```
In [62]: df['body'].value_counts()
```

Out[62]:
```
sedan                     89020
suv                       45799
hatchback                 10588
minivan                   10329
wagon                      4883
crew cab                   4653
coupe                      4630
g sedan                    2980
supercrew                  2850
convertible                2758
van                        2192
e-series van               1530
regular cab                1383
double cab                  867
quad cab                    826
supercab                    590
g coupe                     587
extended cab                361
crewmax cab                 187
genesis coupe               145
elantra coupe               103
access cab                   77
king cab                     72
promaster cargo van          59
beetle convertible           59
koup                         47
q60 convertible              42
g convertible                38
q60 coupe                    36
navitgation                  26
cts coupe                    23
transit van                  19
mega cab                     18
regular-cab                  15
cts-v coupe                   5
tsx sport wagon               2
granturismo convertible       1
Name: body, dtype: int64
```

```
In [63]: l1=[
         'Ford',
         'Chevrolet',
         'Nissan',
         'Dodge',
         'Toyota',
         'Hyundai',
         'Kia',
         'Chrysler',
         'Infiniti'
         ,'Jeep' ]
```

```
In [64]: l1
```

Out[64]: ['Ford',
 'Chevrolet',
 'Nissan',
 'Dodge',
 'Toyota',
 'Hyundai',
 'Kia',
 'Chrysler',
 'Infiniti',
 'Jeep']

```
In [65]: l2=[
'sedan',
'suv',
'hatchback',
'minivan',
'wagon'
]
```

```
In [66]: l2
```

Out[66]: ['sedan', 'suv', 'hatchback', 'minivan', 'wagon']

```
In [67]: l1
```

Out[67]: ['Ford',
 'Chevrolet',
 'Nissan',
 'Dodge',
 'Toyota',
 'Hyundai',
 'Kia',
 'Chrysler',
 'Infiniti',
 'Jeep']

```
In [68]: for a in l1:
             for b in l2:
                 print(f"maker={a} and body={b}")
                 data=maker_body(a,b)
                 print(data.shape,'\n')
```

```
maker=Ford and body=sedan
(13991, 17)

maker=Ford and body=suv
(14132, 17)

maker=Ford and body=hatchback
(3065, 17)

maker=Ford and body=minivan
(151, 17)

maker=Ford and body=wagon
(1066, 17)

maker=Chevrolet and body=sedan
(11909, 17)

maker=Chevrolet and body=suv
(5982, 17)
```

```
In [69]: def maker_body(makers,body):
             data = df[(df['make']==makers) & (df['body']==body)]
             return data
         maker_body('ford','sedan').shape
```

Out[69]: (0, 17)

```
In [70]: data=df[df['make']=='Kia']
         data['body'].unique()
```

Out[70]: array(['suv', 'sedan', 'wagon', 'minivan', 'hatchback', 'koup'],
               dtype=object)

```
In [71]: def m_body(maker):
             data=df[df['make']==maker]
             print(f"{maker} and its body name are ...",data['body'].value_counts())
```

```
In [72]: m_body('Kia')
```

```
Kia and its body name are ... sedan      5779
suv           2669
wagon         1867
minivan        184
hatchback      153
koup            47
Name: body, dtype: int64
```

In [73]:

In [74]: `df.head()`

Out[74]:

	Unnamed: 0	year	make	model	trim	body	transmission	vin	state	co
0	0	2015	Kia	sorento	LX	suv	automatic	5xyktca69fg566472	ca	
1	1	2015	Kia	sorento	LX	suv	automatic	5xyktca69fg561319	ca	
2	2	2015	Volvo	s60	T5	sedan	automatic	yv1612tb4f1310987	ca	
3	3	2015	Nissan	altima	2.5 S	sedan	automatic	1n4al3ap1fn326013	ca	
4	4	2015	Kia	optima	LX	sedan	automatic	5xxgm4a73fg353538	ca	

In [ ]: