In [4]:

```
A = [1,2,3,4,5,6]
B = [13,21,34]
A_B = A.extend(B)
```

In [6]:

```
print(A)
```

```
[1, 2, 3, 4, 5, 6, 13, 21, 34]
```

In [8]:

```
import pandas as pd
fuel_unit = pd.read_csv("fuel_ferc1.csv")
```

In [9]:

```
fuel_unit
```

Out[9]:

	record_id	utility_id_ferc1	report_year	plant_name_ferc1	fuel_type_code_pudl	fuel_unit	fuel_qty_burned	fuel_m
0	f1_fuel_1994_12_1_0_7	1	1994	rockport	coal	ton	5377489.0	
1	f1_fuel_1994_12_1_0_10	1	1994	rockport total plant	coal	ton	10486945.0	
2	f1_fuel_1994_12_2_0_1	2	1994	gorgas	coal	ton	2978683.0	
3	f1_fuel_1994_12_2_0_7	2	1994	barry	coal	ton	3739484.0	
4	f1_fuel_1994_12_2_0_10	2	1994	chickasaw	gas	mcf	40533.0	
5	f1_fuel_1994_12_2_0_13	2	1994	e. c. gaston-unit 5	coal	ton	2124933.0	
6	f1_fuel_1994_12_2_1_1	2	1994	joseph m. farley	nuclear	kgU	2260.0	
7	f1_fuel_1994_12_2_1_10	2	1994	resondent's portion	coal	ton	5372133.0	
8	f1_fuel_1994_12_2_2_10	2	1994	respondent's portion	coal	ton	817520.0	
9	f1_fuel_1994_12_4_0_1	4	1994	units 1-3	coal	ton	1471233.0	
10	f1_fuel_1994_12_4_0_2	4	1994	units 1-3	gas	mcf	262720.0	
11	f1_fuel_1994_12_4_0_4	4	1994	unit 4	coal	ton	476779.0	
12	f1_fuel_1994_12_4_0_5	4	1994	unit 4	gas	mcf	6673.0	
13	f1_fuel_1994_12_6_0_1	6	1994	clinch river	coal	ton	1655558.0	
14	f1_fuel_1994_12_6_0_2	6	1994	clinch river	oil	bbl	6510.0	
15	f1_fuel_1994_12_6_0_4	6	1994	amos-apco share	coal	ton	3520831.0	
16	f1_fuel_1994_12_6_0_7	6	1994	amos-total	coal	ton	5327281.0	
17	f1_fuel_1994_12_6_0_10	6	1994	glen lyn	coal	ton	666975.0	
18	f1_fuel_1994_12_6_0_13	6	1994	kanawha river	coal	ton	391864.0	
19	f1_fuel_1994_12_6_0_14	6	1994	kanawha river	oil	bbl	3505.0	
20	f1_fuel_1994_12_6_1_7	6	1994	mountainr	coal	ton	2837040.0	
21	f1_fuel_1994_12_6_1_8	6	1994	mountainr	oil	bbl	50013.0	
22	f1_fuel_1994_12_6_1_10	6	1994	philip sporn-apco	coal	ton	383043.0	
23	f1_fuel_1994_12_6_1_11	6	1994	philip sporn-apco	oil	bbl	13969.0	
24	f1_fuel_1994_12_6_1_13	6	1994	philip sporn ttl plt	coal	ton	1338459.0	
25	f1_fuel_1994_12_6_1_14	6	1994	philip sporn ttl plt	oil	bbl	48750.0	
26	f1_fuel_1994_12_7_0_1	7	1994	cholla units 1,2,3	coal	ton	2062799.0	
27	f1_fuel_1994_12_7_0_2	7	1994	cholla units 1,2,3	oil	bbl	10088.0	
28	f1_fuel_1994_12_7_0_3	7	1994	cholla units 1,2,3	gas	mcf	38086.0	
29	f1_fuel_1994_12_7_0_7	7	1994	4 corners	coal	ton	2599962.0	
...	...	...	...	...	...	...	...	
29493	f1_fuel_2018_12_191_0_3	191	2018	tecumseh	gas	mcf	25325.0	
29494	f1_fuel_2018_12_191_0_5	191	2018	gordon evans ctf	gas	mcf	2073725.0	
29495	f1_fuel_2018_12_191_0_6	191	2018	gordon evans ctf	oil	bbl	10030.0	
29496	f1_fuel_2018_12_191_0_8	191	2018	spring creek	gas	mcf	2461276.0	
29497	f1_fuel_2018_12_191_0_11	191	2018	emporia ctf	gas	mcf	5853049.0	

29498	f1_fuel_2018_12_191_1_2	191	2018	hutchinson	gas	mcf	170018.0
29499	f1_fuel_2018_12_191_1_3	191	2018	hutchinson	oil	bbl	527.0
29500	f1_fuel_2018_12_191_1_6	191	2018	hutchinson w/diesel	oil	bbl	36.0
29501	f1_fuel_2018_12_191_1_8	191	2018	jeffrey (jec)	coal	ton	4189920.0
29502	f1_fuel_2018_12_191_1_9	191	2018	jeffrey (jec)	oil	bbl	19764.0
29503	f1_fuel_2018_12_191_1_14	191	2018	lawrence	coal	ton	1761218.0
29504	f1_fuel_2018_12_191_1_15	191	2018	lawrence	gas	mcf	88846.0
29505	f1_fuel_2018_12_432_0_2	432	2018	pueblo diesels	oil	bbl	81.0
29506	f1_fuel_2018_12_432_0_5	432	2018	airport - pueblo	oil	bbl	133.0
29507	f1_fuel_2018_12_432_0_8	432	2018	rocky ford diesels	oil	bbl	320.0
29508	f1_fuel_2018_12_432_0_11	432	2018	airport - units 1&2	gas	mcf	2154971.0
29509	f1_fuel_2018_12_432_0_14	432	2018	airport unit 6	gas	mcf	162132.0
29510	f1_fuel_2018_12_403_0_2	403	2018	wygen 2	coal	ton	569800.0
29511	f1_fuel_2018_12_403_0_6	403	2018	cheyenne prairie 42%	gas	mcf	613882.0
29512	f1_fuel_2018_12_403_0_9	403	2018	cheyenne prairie	gas	mcf	19655.0
29513	f1_fuel_2018_12_12_0_2	12	2018	ben french station	gas	mcf	39679.0
29514	f1_fuel_2018_12_12_0_4	12	2018	ben french station	oil	bbl	487.0
29515	f1_fuel_2018_12_12_0_7	12	2018	neil simpson unit 2	gas	mcf	18370.0
29516	f1_fuel_2018_12_12_0_8	12	2018	neil simpson unit 2	coal	ton	491913.0
29517	f1_fuel_2018_12_12_0_10	12	2018	wyodak - bhp 20%	coal	ton	409637.0
29518	f1_fuel_2018_12_12_0_13	12	2018	neil simpson ct #1	gas	mcf	18799.0
29519	f1_fuel_2018_12_12_1_1	12	2018	cheyenne prairie 58%	gas	mcf	806730.0
29520	f1_fuel_2018_12_12_1_10	12	2018	lange ct facility	gas	mcf	104554.0
29521	f1_fuel_2018_12_12_1_13	12	2018	wygen 3 bhp 52%	coal	ton	315945.0
29522	f1_fuel_2018_12_12_1_14	12	2018	wygen 3 bhp 52%	gas	mcf	17853.0

29523 rows × 11 columns

In [12]:

```
import pandas as pd
fuel_unit = pd.read_csv("fuel_ferc1.csv")
```

In [16]:

```
fuel_unit.head()
```

Out[16]:

	record_id	utility_id_ferc1	report_year	plant_name_ferc1	fuel_type_code_pudl	fuel_unit	fuel_qty_burned	fuel_mmbtu_
0	f1_fuel_1994_12_1_0_7	1	1994	rockport	coal	ton	5377489.0	
1	f1_fuel_1994_12_1_0_10	1	1994	rockport total plant	coal	ton	10486945.0	
2	f1_fuel_1994_12_2_0_1	2	1994	gorgas	coal	ton	2978683.0	
3	f1_fuel_1994_12_2_0_7	2	1994	barry	coal	ton	3739484.0	
4	f1_fuel_1994_12_2_0_10	2	1994	chickasaw	gas	mcf	40533.0	

In [17]:

```
average=fuel_unit['fuel_cost_per_unit_burned'].mean
```

In [18]:

```
average
```

Out[18]:

```
<bound method Series.mean of 0         18.590
1         18.580
2         39.720
3         47.210
4          2.770
5         44.240
6         28.770
7         58.540
8         33.970
9         28.730
10         1.940
11        28.710
12         1.940
13        30.248
14        32.130
15        44.404
16        44.312
17        36.268
18        46.024
19        33.321
20        39.911
21        30.319
22        39.850
23        32.184
24        40.144
25        32.186
26        31.520
27        32.650
28         2.490
29        21.170
          ...
29493      6.462
29494      4.462
29495     94.777
29496      2.328
29497      3.681
29498      4.536
29499    102.110
29500    102.488
29501     29.799
29502     88.553
29503     26.775
29504      6.274
29505    101.330
29506     95.530
29507     98.180
29508    255.000
29509      2.460
29510     14.760
29511      3.520
29512      8.910
29513      5.680
29514      0.000
29515      8.330
29516     14.760
29517     13.690
29518      4.780
29519      3.650
29520      4.770
29521      3.060
29522      0.000
Name: fuel_cost_per_unit_burned, Length: 29523, dtype: float64>
```

In [20]:

```
fuel_unit.describe()
```

Out[20]:

	utility_id_ferc1	report_year	fuel_qty_burned	fuel_mmbtu_per_unit	fuel_cost_per_unit_burned	fuel_cost_per_unit_delivered	fuel_c
count	29523.000000	29523.000000	2.952300e+04	29523.000000	29523.000000	2.952300e+04	
mean	118.601836	2005.806050	2.622119e+06	8.492111	208.649031	9.175704e+02	
std	74.178353	7.025483	9.118004e+06	10.600220	2854.490090	6.877593e+04	
min	1.000000	1994.000000	1.000000e+00	0.000001	-276.080000	-8.749370e+02	
25%	55.000000	2000.000000	1.381700e+04	1.024000	5.207000	3.778500e+00	
50%	122.000000	2006.000000	2.533220e+05	5.762694	26.000000	1.737100e+01	
75%	176.000000	2012.000000	1.424034e+06	17.006000	47.113000	4.213700e+01	
max	514.000000	2018.000000	5.558942e+08	341.260000	139358.000000	7.964521e+06	

In [22]:

```
import pandas as pd
fuel_unit = pd.read_csv("fuel_ferc1.csv")
fuel_unit.skew(axis = 0, skipna = True)
```

Out[22]:

```
utility_id_ferc1                0.605070
report_year                     0.006953
fuel_qty_burned                15.851495
fuel_mmbtu_per_unit             4.135217
fuel_cost_per_unit_burned      19.787440
fuel_cost_per_unit_delivered  105.014227
fuel_cost_per_mmbtu           171.675535
dtype: float64
```

In [23]:

```
import pandas as pd
import numpy as np

fuel_unit = pd.read_csv("fuel_ferc1.csv")
```

In [28]:

```
df1 = fuel_unit.isnull()
```

In [29]:

```
df1
```

Out[29]:

	record_id	utility_id_ferc1	report_year	plant_name_ferc1	fuel_type_code_pudl	fuel_unit	fuel_qty_burned	fuel_mmbtu_per_unit
0	False	False	False	False	False	False	False	False
1	False	False	False	False	False	False	False	False
2	False	False	False	False	False	False	False	False
3	False	False	False	False	False	False	False	False
4	False	False	False	False	False	False	False	False
5	False	False	False	False	False	False	False	False
6	False	False	False	False	False	False	False	False
7	False	False	False	False	False	False	False	False
8	False	False	False	False	False	False	False	False
9	False	False	False	False	False	False	False	False
10	False	False	False	False	False	False	False	False
11	False	False	False	False	False	False	False	False
12	False	False	False	False	False	False	False	False
13	False	False	False	False	False	False	False	False
14	False	False	False	False	False	False	False	False
15	False	False	False	False	False	False	False	False
16	False	False	False	False	False	False	False	False

17	False	False	False	False	False	False	False	False
18	False	False	False	False	False	False	False	False
19	False	False	False	False	False	False	False	False
20	False	False	False	False	False	False	False	False
21	False	False	False	False	False	False	False	False
22	False	False	False	False	False	False	False	False
23	False	False	False	False	False	False	False	False
24	False	False	False	False	False	False	False	False
25	False	False	False	False	False	False	False	False
26	False	False	False	False	False	False	False	False
27	False	False	False	False	False	False	False	False
28	False	False	False	False	False	False	False	False
29	False	False	False	False	False	False	False	False
...	...	...	...	...	...	...	...	...
29493	False	False	False	False	False	False	False	False
29494	False	False	False	False	False	False	False	False
29495	False	False	False	False	False	False	False	False
29496	False	False	False	False	False	False	False	False
29497	False	False	False	False	False	False	False	False
29498	False	False	False	False	False	False	False	False
29499	False	False	False	False	False	False	False	False
29500	False	False	False	False	False	False	False	False
29501	False	False	False	False	False	False	False	False
29502	False	False	False	False	False	False	False	False
29503	False	False	False	False	False	False	False	False
29504	False	False	False	False	False	False	False	False
29505	False	False	False	False	False	False	False	False
29506	False	False	False	False	False	False	False	False
29507	False	False	False	False	False	False	False	False
29508	False	False	False	False	False	False	False	False
29509	False	False	False	False	False	False	False	False
29510	False	False	False	False	False	False	False	False
29511	False	False	False	False	False	False	False	False
29512	False	False	False	False	False	False	False	False
29513	False	False	False	False	False	False	False	False
29514	False	False	False	False	False	False	False	False
29515	False	False	False	False	False	False	False	False
29516	False	False	False	False	False	False	False	False
29517	False	False	False	False	False	False	False	False
29518	False	False	False	False	False	False	False	False
29519	False	False	False	False	False	False	False	False
29520	False	False	False	False	False	False	False	False
29521	False	False	False	False	False	False	False	False
29522	False	False	False	False	False	False	False	False

29523 rows × 11 columns

In [30]:

```
df1.sum()
```

Out[30]:

```
record_id                         0
utility_id_ferc1                  0
report_year                       0
plant_name_ferc1                  0
fuel_type_code_pudl               0
fuel_unit                       180
fuel_qty_burned                   0
fuel_mmbtu_per_unit               0
fuel_cost_per_unit_burned         0
fuel_cost_per_unit_delivered      0
fuel_cost_per_mmbtu               0
dtype: int64
```

In [32]:

```
import pandas as pd
import numpy as np

fuel_unit = pd.read_csv("fuel_ferc1.csv")
```

In [44]:

```
fuel_unit.corr()
```

Out[44]:

	utility_id_ferc1	report_year	fuel_qty_burned	fuel_mmbtu_per_unit	fuel_cost_per_unit_burned	fuel_cost_pe
utility_id_ferc1	1.000000	0.093323	-0.057447	-0.066946	-0.037863	
report_year	0.093323	1.000000	0.012952	-0.110853	0.013599	
fuel_qty_burned	-0.057447	0.012952	1.000000	-0.080946	-0.018535	
fuel_mmbtu_per_unit	-0.066946	-0.110853	-0.080946	1.000000	-0.010034	
fuel_cost_per_unit_burned	-0.037863	0.013599	-0.018535	-0.010034	1.000000	
fuel_cost_per_unit_delivered	-0.016414	-0.014043	-0.003551	-0.009039	0.011007	
fuel_cost_per_mmbtu	0.006122	0.010261	-0.001896	-0.005884	-0.000437	

In [47]:

```
max1 = fuel_unit['report_year'].max()
```

In [48]:

```
max1
```

Out[48]:

```
2018
```

In [ ]:

In [ ]:

In [ ]: