

```
C:\Users\kaelth4s\Drafts\IKBFU\machine-learning\.venv\Scripts\  
python.exe C:\Users\kaelth4s\Drafts\IKBFU\machine-learning\lab1\  
lab1.py
```

Задание 1:

1.

```
[[1. 1. 1. 1. 1.]  
 [1. 1. 1. 1. 1.]  
 [1. 1. 1. 1. 1.]  
 [1. 1. 1. 1. 1.]  
 [1. 1. 1. 1. 1.]]
```

2. Создаем массив [0, 10000) так как размер не указан в задании.

```
[7279.6796536 5706.83375444 919.66196836 100.48213693 5525.
```

24872087

```
2992.26706593 5170.93239375 3271.19489889 5693.50715437 3892.
```

80329339

```
1900.64913553 3358.56284846 4529.75129003 5010.94012114 4473.
```

40351956

```
2784.79401934 4488.33813981 1821.22816015 1968.70928523 26.
```

2662149]

3.

```
[[7279.6796536 5706.83375444 919.66196836 100.48213693 5525.
```

24872087]

```
[2992.26706593 5170.93239375 3271.19489889 5693.50715437 3892.
```

80329339]

```
[1900.64913553 3358.56284846 4529.75129003 5010.94012114 4473.
```

40351956]

```
[2784.79401934 4488.33813981 1821.22816015 1968.70928523 26.
```

2662149]]

Задание 2:

Введите n: 5

Введите m: 4

Создаем массив [0, 10000) так как размер не указан в задании.

Исходный массив:

```
[[7126.83277664 4301.03781992 9445.67196029 9607.68204866]
```

```
[2669.50725918 3655.9447998 2144.89600969 2677.73742639]
```

```
[8100.18198747 8581.5701354 8971.52592262 1315.23750429]
```

```
[9894.91339257 5321.25053772 3227.86856015 7271.87788286]
```

```
[2949.85574338 9934.17119433 4733.59596558 5615.86322117]]
```

1.

Введите k: 2000

Массив элементов, больших чем k:

```
[7126.83277664 4301.03781992 9445.67196029 9607.68204866 2669.
```

50725918

3655.9447998	2144.89600969	2677.73742639	8100.18198747	8581.
5701354				
8971.52592262	9894.91339257	5321.25053772	3227.86856015	7271.
87788286				
2949.85574338	9934.17119433	4733.59596558	5615.86322117]	

2.

Математическое ожидание: 5877.361107406036

Дисперсия: 8227378.543392817

Среднеквадратичное отклонение: 2868.340730002769

3.

Минимальный элемент: 1315.2375042884269

Максимальный элемент: 9934.171194327919

Задание 3:

Создаем два вектора размера 5 со значениями [0, 10000)

Вектор А: [6393.50558171 6888.93212753 1850.69365561 7765.

24543759 3519.35267624]

Вектор В: [3400.88515196 5403.55811665 2542.24137126 7654.

60262794 1446.52282629]

1.

Косинус угла между векторами: 0.9623996543913247

2.

Евклидово расстояние между векторами: 3993.647036224738

Задание 4:

1. Создаем массив x значений:

-10.	-9.5	-9.	-8.5	-8.	-7.5	-7.	-6.5	-6.	-5.5	-5
.	-4.5									
-4.	-3.5	-3.	-2.5	-2.	-1.5	-1.	-0.5	0.	0.5	1
.	1.5									
2.	2.5	3.	3.5	4.	4.5	5.	5.5	6.	6.5	7
.	7.5									
8.	8.5	9.	9.5	10.]					

2. Вычисляем значения функции $y = x^2 - x + 2$:

112.	101.75	92.	82.75	74.	65.75	58.	50.75	44.
37.75								
32.	26.75	22.	17.75	14.	10.75	8.	5.75	4.
2.75								
2.	1.75	2.	2.75	4.	5.75	8.	10.75	14.
17.75								
22.	26.75	32.	37.75	44.	50.75	58.	65.75	74.
82.75								
92.]							

3. Создаем таблицу значений с использованием DataFrame:

x	y
-10.0	112.00
-9.5	101.75
-9.0	92.00
-8.5	82.75
-8.0	74.00
-7.5	65.75
-7.0	58.00
-6.5	50.75
-6.0	44.00
-5.5	37.75
-5.0	32.00
-4.5	26.75
-4.0	22.00
-3.5	17.75
-3.0	14.00
-2.5	10.75
-2.0	8.00
-1.5	5.75
-1.0	4.00
-0.5	2.75
0.0	2.00
0.5	1.75
1.0	2.00
1.5	2.75
2.0	4.00
2.5	5.75
3.0	8.00
3.5	10.75
4.0	14.00
4.5	17.75
5.0	22.00
5.5	26.75
6.0	32.00
6.5	37.75
7.0	44.00
7.5	50.75
8.0	58.00
8.5	65.75
9.0	74.00
9.5	82.75
10.0	92.00

Задание 5:

1. Загрузка данных из файла sp500.csv

Первые 10 строк данных:

	Symbol	...	SEC Filings
0	MMM	...	http://www.sec.gov/cgi-bin/browse-edgar?action...
1	ABT	...	http://www.sec.gov/cgi-bin/browse-edgar?action...
2	ABBV	...	http://www.sec.gov/cgi-bin/browse-edgar?action...
3	ACN	...	http://www.sec.gov/cgi-bin/browse-edgar?action...
4	ACE	...	http://www.sec.gov/cgi-bin/browse-edgar?action...
5	ACT	...	http://www.sec.gov/cgi-bin/browse-edgar?action...
6	ADBE	...	http://www.sec.gov/cgi-bin/browse-edgar?action...
7	AES	...	http://www.sec.gov/cgi-bin/browse-edgar?action...
8	AET	...	http://www.sec.gov/cgi-bin/browse-edgar?action...
9	AFL	...	http://www.sec.gov/cgi-bin/browse-edgar?action...

[10 rows x 15 columns]

2. Загрузка только выбранных столбцов

	Symbol	Name	Sector	...	52 week
high	Market Cap				
				...	
143.37	MMM	3M Co.	Industrials	...	
40.49	ABT	Abbott Laboratories	Health Care	...	
54.78	ABBV	AbbVie Inc.	Health Care	...	
85.88	ACN	Accenture	Information Technology	...	
104.07	ACE	ACE Limited	Financials	...	
230.77	ACT	Actavis Inc	Health Care	...	
71.11	ADBE	Adobe Systems Inc	Information Technology	...	
15.54	AES	AES Corp	Utilities	...	
76.71	AET	Aetna Inc	Health Care	...	
67.62	AFL	AFLAC Inc	Financials	...	

[10 rows x 7 columns]

3. Значения столбца Name:

Symbol	Name
MMM	3M Co.
ABT	Abbott Laboratories
ABBV	AbbVie Inc.

ACN	Accenture
ACE	ACE Limited
...	
YHOO	Yahoo Inc.
YUM	Yum! Brands Inc
ZMH	Zimmer Holdings
ZION	Zions Bancorp
ZTS	Zoetis Inc
Name: Name, Length: 500, dtype: object	

4. Страна с индексом NFLX:

Name	NetFlix Inc.
Sector	Information Technology
Price	402.35
Book Value	24.664
52 week low	205.75
52 week high	458.0
Market Cap	24.117
Name: NFLX, dtype: object	

5. Страна с номером 238 (по порядку):

Name	International Bus. Machines
Sector	Information Technology
Price	185.94
Book Value	16.407
52 week low	172.19
52 week high	211.98
Market Cap	188.2
Name: IBM, dtype: object	

Задание 6:

Загрузка данных из файла sp500.csv

1. Строки с 100 по 120:

Symbol	Name	...	Market Cap
CTAS	Cintas Corporation	...	7.407
CSCO	Cisco Systems	...	125.600
C	Citigroup Inc.	...	143.700
CTXS	Citrix Systems	...	10.068
CLF	Cliffs Natural Resources	...	2.503
CLX	Clorox Co.	...	11.358
CME	CME Group Inc.	...	23.841
CMS	CMS Energy	...	7.864
COH	Coach Inc.	...	11.386
KO	Coca Cola Co.	...	178.400
CCE	Coca-Cola Enterprises	...	11.528
CTSH	Cognizant Technology Solutions	...	29.583

CL	Colgate-Palmolive	...	61.084
CMCSA	Comcast Corp.	...	135.100
CMA	Comerica Inc.	...	8.504
CSC	Computer Sciences Corp.	...	8.973
CAG	ConAgra Foods Inc.	...	13.313
COP	ConocoPhillips	...	96.289
CNX	CONSOL Energy Inc.	...	10.215
ED	Consolidated Edison	...	15.854
STZ	Constellation Brands	...	15.825

[21 rows x 7 columns]

2. Копия датафрейма без столбца Book Value:

Symbol	Name	Sector	...	52 week
high Market Cap				
...				
...				
MMM	3M Co.	Industrials	...	
143.37	92.345			
ABT	Abbott Laboratories	Health Care	...	
40.49	59.477			
ABBV	AbbVie Inc.	Health Care	...	
54.78	85.784			
ACN	Accenture	Information Technology	...	
85.88	50.513			
ACE	ACE Limited	Financials	...	
104.07	34.753			
...
...	...			
YHOO	Yahoo Inc.	Information Technology	...	
41.72	35.258			
YUM	Yum! Brands Inc	Consumer Discretionary	...	
79.70	33.002			
ZMH	Zimmer Holdings	Health Care	...	
108.33	17.091			
ZION	Zions Bancorp	Financials	...	
33.33	5.257			
ZTS	Zoetis Inc	Health Care	...	
34.28	15.296			

[500 rows x 6 columns]

3. Строки где 52 week low < 80:

Symbol	Name	Sector	...	52 week
high Market Cap				
...				
...				

ABT	Abbott Laboratories		Health Care	...
40.49	59.477			
ABBV	AbbVie Inc.		Health Care	...
54.78	85.784			
ACN	Accenture	Information Technology		...
85.88	50.513			
ADBE	Adobe Systems Inc	Information Technology		...
71.11	32.004			
AES	AES Corp		Utilities	...
15.54	9.872			
...
...	...			
YHOO	Yahoo Inc.	Information Technology		...
41.72	35.258			
YUM	Yum! Brands Inc	Consumer Discretionary		...
79.70	33.002			
ZMH	Zimmer Holdings		Health Care	...
108.33	17.091			
ZION	Zions Bancorp		Financials	...
33.33	5.257			
ZTS	Zoetis Inc		Health Care	...
34.28	15.296			

[415 rows x 7 columns]

4. Строки где Sector = 'Financials' или 'Energy':

		Name	Sector	...	52 week high
Market Cap					
Symbol				...	
ACE		ACE Limited	Financials	...	104.07
	34.753				
AFL		AFLAC Inc	Financials	...	67.62
	27.844				
ALL		Allstate Corp	Financials	...	58.69
	25.336				
AXP		American Express Co	Financials	...	94.35
	94.107				
AIG		American Intl Group Inc	Financials	...	54.03
	77.540				
...	
VNO		Vornado Realty Trust	Financials	...	106.65
	19.738				
WFC		Wells Fargo	Financials	...	50.49
	264.200				

WY	Weyerhaeuser Corp.	Financials	...	32.55
	18.059			
XL	XL Capital	Financials	...	33.12
	8.816			
ZION	Zions Bancorp	Financials	...	33.33
	5.257			

[123 rows x 7 columns]

5. Строки где (Sector = 'Financials' или 'Energy') и 52 week low > 50:

		Name	Sector	...	52 week
high	Market Cap				
Symbol				...	
ACE		ACE Limited	Financials	...	104.
07	34.7530				
AFL		AFLAC Inc	Financials	...	67.
62	27.8440				
AXP		American Express Co	Financials	...	94.
35	94.1070				
AMT		American Tower Corp A	Financials	...	90.
00	34.9880				
AMP		Ameriprise Financial	Financials	...	116.
82	21.0630				
APC		Anadarko Petroleum Corp	Energy	...	104.
84	51.1870				
AON		Aon plc	Financials	...	88.
61	26.2180				
APA		Apache Corporation	Energy	...	94.
84	34.7830				
AVB		AvalonBay Communities, Inc.	Financials	...	141.
71	18.1530				
BRK-B		Berkshire Hathaway	Financials	...	129.
73	0.2085				
BLK		BlackRock	Financials	...	326.
00	50.8580				
BXP		Boston Properties	Financials	...	121.
05	18.1980				
CAM		Cameron International Corp.	Energy	...	66.
93	12.9150				
COF		Capital One Financial	Financials	...	78.
49	44.0750				
CVX		Chevron Corp.	Energy	...	127.
83	234.9000				
CB		Chubb Corp.	Financials	...	97.
79	22.4460				

CME		CME Group Inc.	Financials	...	84.
71	23.8410				
COP		ConocoPhillips	Energy	...	78.
82	96.2890				
DVN		Devon Energy Corp.	Energy	...	73.
79	29.6340				
EOG		EOG Resources	Energy	...	106.
50	56.8200				
EFX		Equifax Inc.	Financials	...	72.
90	8.4850				
EQR		Equity Residential	Financials	...	62.
57	22.0260				
XOM		Exxon Mobil Corp.	Energy	...	103.
45	435.1000				
GS		Goldman Sachs Group	Financials	...	181.
13	74.4420				
HCN		Health Care REIT	Financials	...	74.
77	18.8020				
HP		Helmerich & Payne	Energy	...	117.
00	11.4580				
HES		Hess Corporation	Energy	...	91.
92	28.5840				
ICE		IntercontinentalExchange Inc.	Financials	...	229.
50	22.1660				
JPM		JPMorgan Chase & Co.	Financials	...	61.
48	206.4000				
MTB		M&T Bank Corp.	Financials	...	124.
16	15.9320				
MAC		Macerich Co	Financials	...	67.
74	9.2240				
MPC		Marathon Petroleum	Energy	...	97.
70	25.1510				
MHFI		McGraw Hill Financial Inc	Financials	...	82.
39	21.6620				
MCO		Moody's Corp	Financials	...	85.
70	17.6300				
MUR		Murphy Oil	Energy	...	66.
20	10.9070				
NOV		National Oilwell Varco Inc.	Energy	...	84.
71	35.1390				
NBL		Noble Energy Inc	Energy	...	78.
01	25.2000				
NTRS		Northern Trust Corp.	Financials	...	67.
17	14.2740				
OXY		Occidental Petroleum	Energy	...	99.
42	76.1810				
PSX		Phillips 66	Energy	...	85.
42	46.4160				

PXD	Pioneer Natural Resources	Energy	...	227.
42	28.9400			
PNC	PNC Financial Services	Financials	...	88.
03	45.1390			
PRU	Prudential Financial	Financials	...	92.
68	37.7550			
PSA	Public Storage	Financials	...	176.
72	29.5680			
RRC	Range Resources Corp.	Energy	...	95.
41	14.2310			
SLB	Schlumberger Ltd.	Energy	...	103.
58	132.0000			
SPG	Simon Property Group Inc	Financials	...	177.
74	54.4460			
STT	State Street Corp.	Financials	...	76.
24	27.7580			
TROW	T. Rowe Price Group	Financials	...	84.
73	21.2290			
TMK	Torchmark Corp.	Financials	...	81.
98	7.1210			
TRV	The Travelers Companies Inc.	Financials	...	93.
34	32.2660			
VTR	Ventas Inc	Financials	...	77.
84	19.7290			
VNO	Vornado Realty Trust	Financials	...	106.
65	19.7380			

[53 rows x 7 columns]

Задание 7:

Загрузка данных из файла tips.csv

	total_bill	tip	smoker	day	time	size
0	16.99	1.01	No	Sun	Dinner	2
1	10.34	1.66	No	Sun	Dinner	3
2	21.01	3.50	No	Sun	Dinner	3
3	23.68	3.31	No	Sun	Dinner	2
4	24.59	3.61	No	Sun	Dinner	4
..
239	29.03	5.92	No	Sat	Dinner	3
240	27.18	2.00	Yes	Sat	Dinner	2
241	22.67	2.00	Yes	Sat	Dinner	2
242	17.82	1.75	No	Sat	Dinner	2
243	18.78	3.00	No	Thur	Dinner	2

[244 rows x 6 columns]

Базовые статистики для столбца 'tip'

1. Количество значений:

Количество значений: 244

2. Минимальная и максимальная цена:

Минимальные чаевые: 1.0

Максимальные чаевые: 10.0

3. Среднее значение, медиана и мода:

Среднее значение: 2.99827868852459

Медиана: 2.9

Мода: 2.0

4. Дисперсия и среднеквадратичное отклонение:

Дисперсия: 1.914454638062471

Стандартное отклонение: 1.3836381890011822

5. Ковариация и корреляция 'tip' с другими числовыми колонками:

С колонкой total_bill :

Ковариация: 8.323501629224854

Корреляция: 0.6757341092113643

С колонкой size :

Ковариация: 0.6439064291978687

Корреляция: 0.48929877523035786

Process finished with exit code 0