

```
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 A: [6393.50558171 6888.93212753 1850.69365561 7765.24543759 3519.35267624]

Вектор B: [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	...	<a href="http://www.sec.gov/cgi-bin/browse-edgar?action...">http://www.sec.gov/cgi-bin/browse-edgar?action...</a>
1	ABT	...	<a href="http://www.sec.gov/cgi-bin/browse-edgar?action...">http://www.sec.gov/cgi-bin/browse-edgar?action...</a>
2	ABBV	...	<a href="http://www.sec.gov/cgi-bin/browse-edgar?action...">http://www.sec.gov/cgi-bin/browse-edgar?action...</a>
3	ACN	...	<a href="http://www.sec.gov/cgi-bin/browse-edgar?action...">http://www.sec.gov/cgi-bin/browse-edgar?action...</a>
4	ACE	...	<a href="http://www.sec.gov/cgi-bin/browse-edgar?action...">http://www.sec.gov/cgi-bin/browse-edgar?action...</a>
5	ACT	...	<a href="http://www.sec.gov/cgi-bin/browse-edgar?action...">http://www.sec.gov/cgi-bin/browse-edgar?action...</a>
6	ADBE	...	<a href="http://www.sec.gov/cgi-bin/browse-edgar?action...">http://www.sec.gov/cgi-bin/browse-edgar?action...</a>
7	AES	...	<a href="http://www.sec.gov/cgi-bin/browse-edgar?action...">http://www.sec.gov/cgi-bin/browse-edgar?action...</a>
8	AET	...	<a href="http://www.sec.gov/cgi-bin/browse-edgar?action...">http://www.sec.gov/cgi-bin/browse-edgar?action...</a>
9	AFL	...	<a href="http://www.sec.gov/cgi-bin/browse-edgar?action...">http://www.sec.gov/cgi-bin/browse-edgar?action...</a>

[10 rows x 15 columns]

## 2. Загрузка только выбранных столбцов

	Name	Sector	...	52 week
high Market Cap				
Symbol			...	
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			
ACT	Actavis Inc	Health Care	...	
230.77	37.291			
ADBE	Adobe Systems Inc	Information Technology	...	
71.11	32.004			
AES	AES Corp	Utilities	...	
15.54	9.872			
AET	Aetna Inc	Health Care	...	
76.71	27.302			
AFL	AFLAC Inc	Financials	...	
67.62	27.844			

[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
...
YH00         Yahoo Inc.
YUM          Yum! Brands Inc
ZMH          Zimmer Holdings
ZION         Zions Bancorp
ZTS          Zoetis Inc
Name: Name, Length: 500, dtype: object

```

#### 4. Строка 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. Строка 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:

	Name	...	Market Cap
Symbol		...	
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:

	Name	Sector	...	52 week
high Market Cap				
Symbol				
			...	
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			
...	...		...	...
...	...			
YH00	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 &lt; 80:

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

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':

Market Cap	Name	Sector	...	52 week high
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