Authenticator

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Approve sign-in request

Open your Authenticator app, and enter the number shown to sign in.

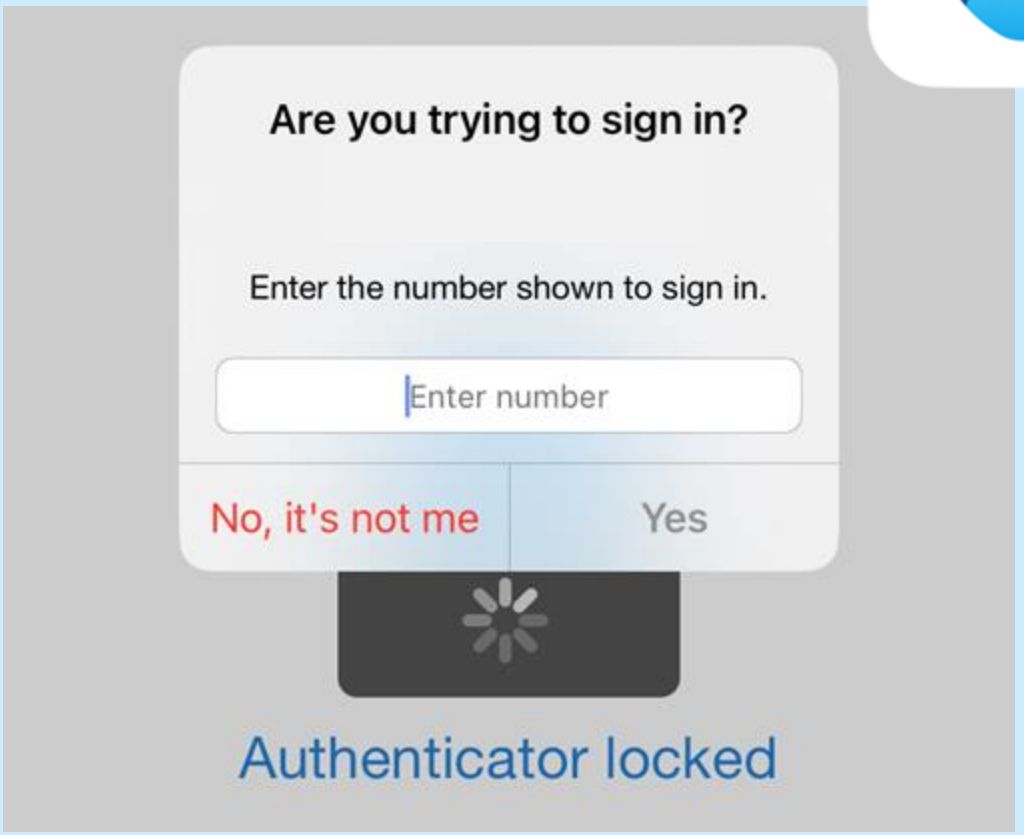
58

No numbers in your app? Make sure to upgrade to the latest version.

I can't use my Microsoft Authenticator app right now

More information

This service is available to authorised users only. By using this facility you confirm that such use shall comply with Durham University IT Regulations.



	0	10	20	30	40	50	60	70	80	90
0										
1										
2										
3										
4										
5										
6										
7										
8										
9										

Results


AUTHENTICATOR
BINGO
Which number did you get today?
0 10 20 30 40 50 60 70 80 90
How do you make your Tea?
Milk, Bag, Water
Bag, Water, Milk
Water, Milk, Bag
Milk, Water, Bag
Bag, Milk, Water
Water, Bag, Milk
Milk, Water, Bag
no stress just vibes
(Do not erase)

The question

- How many times do we need to log in to have drawn all possible numbers
- Can we hack the system? – Are there numbers that appears more/less often than others

	0	10	20	30	40	50	60	70	80	90
0										
1										
2										
3										
4										
5										
6										
7										
8										
9										

Coupon Collector’s problem

- How many coupons do we need to draw (on average) with replacement, before having drawn every coupon at least once?
- Geometric random variable – number of trials required to achieve success:

$$E(X) = \frac{1}{p}$$

Assumptions

- Every number has an equally likely chance of being drawn

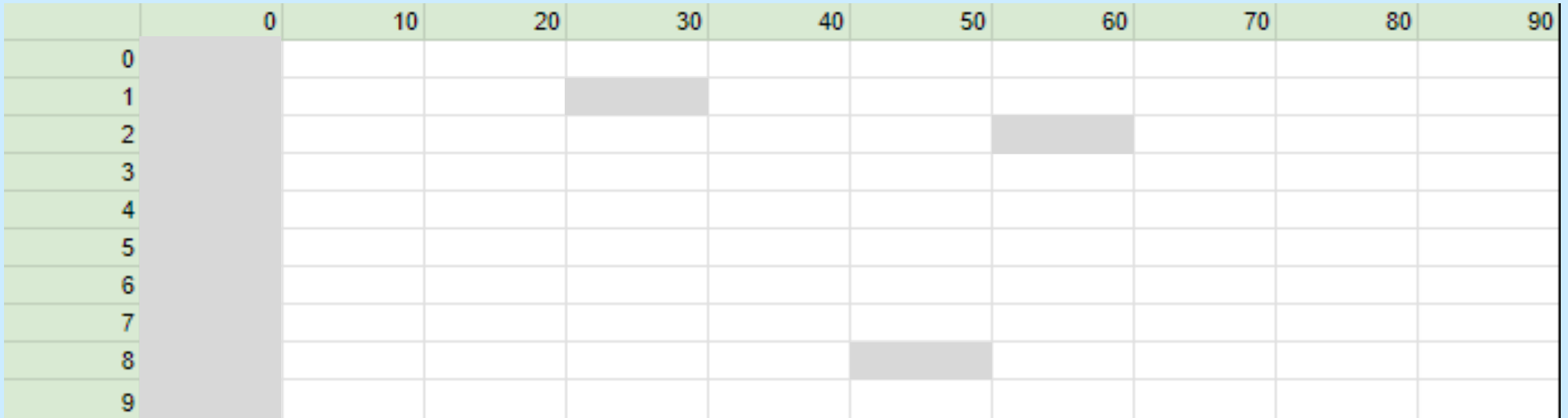
- Infinite number of logins

- 90 possible authenticator numbers
- 1st time you log in $\mathbb{P}(\textit{90 numbers to collect}) = \frac{90}{90}$ or 100%
- 2nd time you log in

$$\mathbb{P}(\textit{89 numbers to collect}) = \frac{89}{90}$$

- 3 numbers crossed off

$$\mathbb{P}(\textit{88 numbers left to collect}) = \frac{88}{90}$$

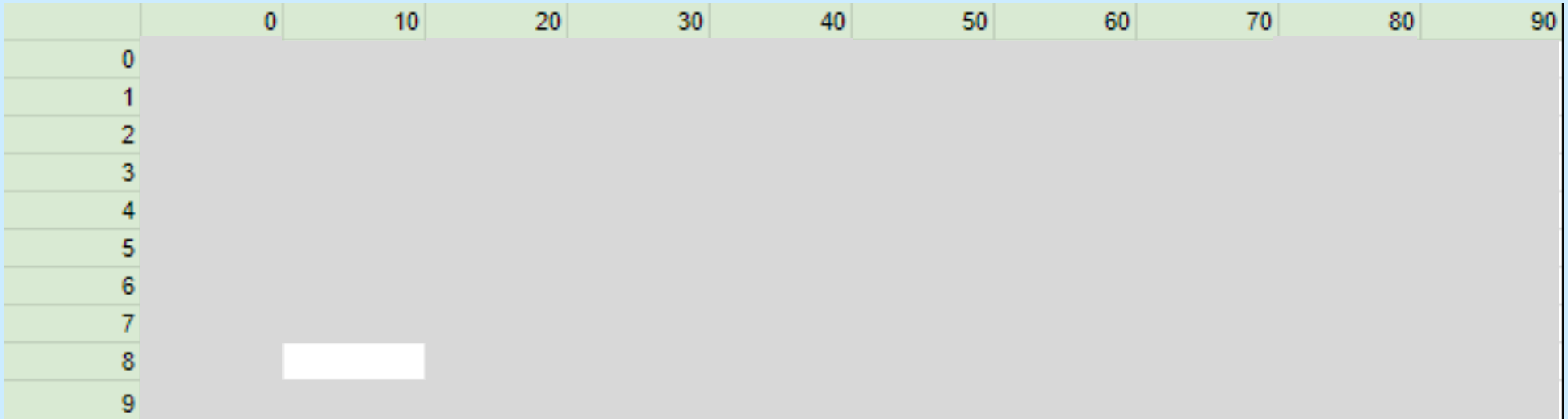


- 89 numbers crossed off

$$\mathbb{P}(2\ numbers\ left\ to\ collect) = \frac{2}{90}$$

- All 90 numbers crossed off

$$\mathbb{P}(1\ number\ left\ to\ collect) = \frac{1}{90}$$



Expected number of total logins

$$E(p_1 + p_2 + \cdots + p_{90})$$

$$= E(p_1) + E(p_2) + \cdots + E(p_{90})$$

$$= \frac{90}{90} + \frac{90}{89} + \cdots + \frac{90}{2} + \frac{90}{1}$$

$$= 90\left(\frac{1}{1} + \frac{1}{2} + \cdots + \frac{1}{89} + \frac{1}{90}\right)$$

Harmonic series!

$$= 90\, H_{90}$$

458 logins on average!

Results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Which number did you get today?
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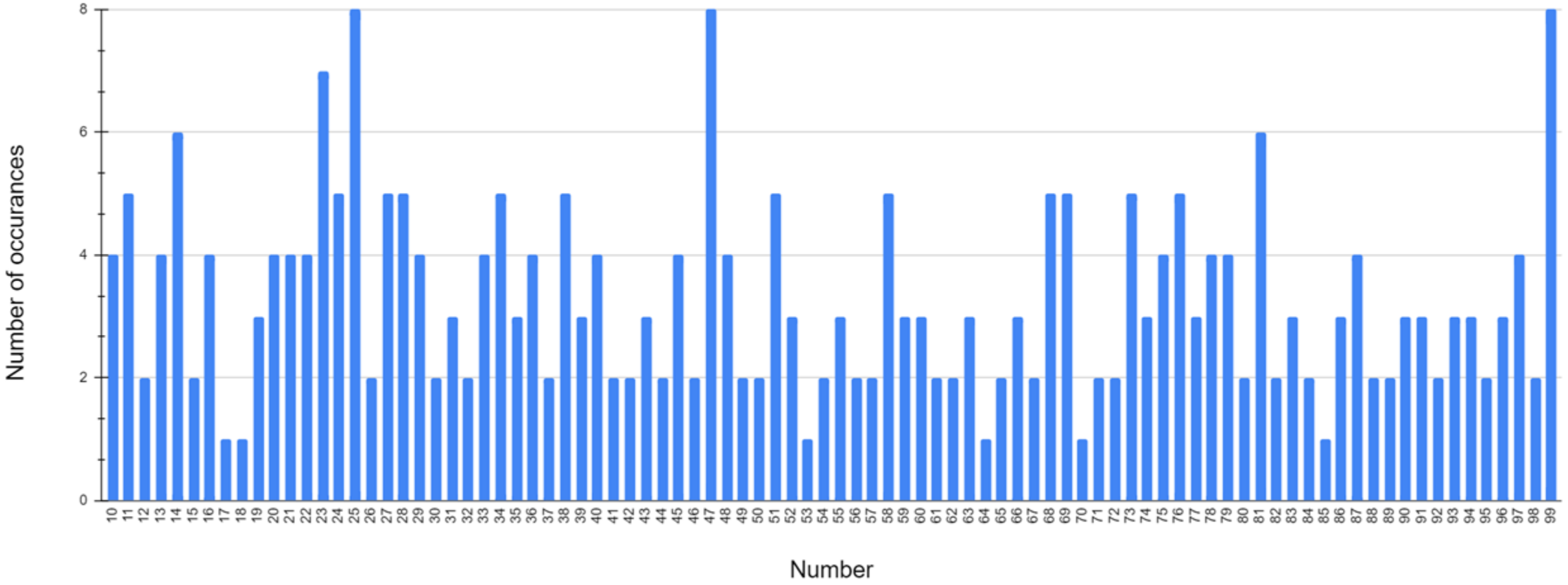
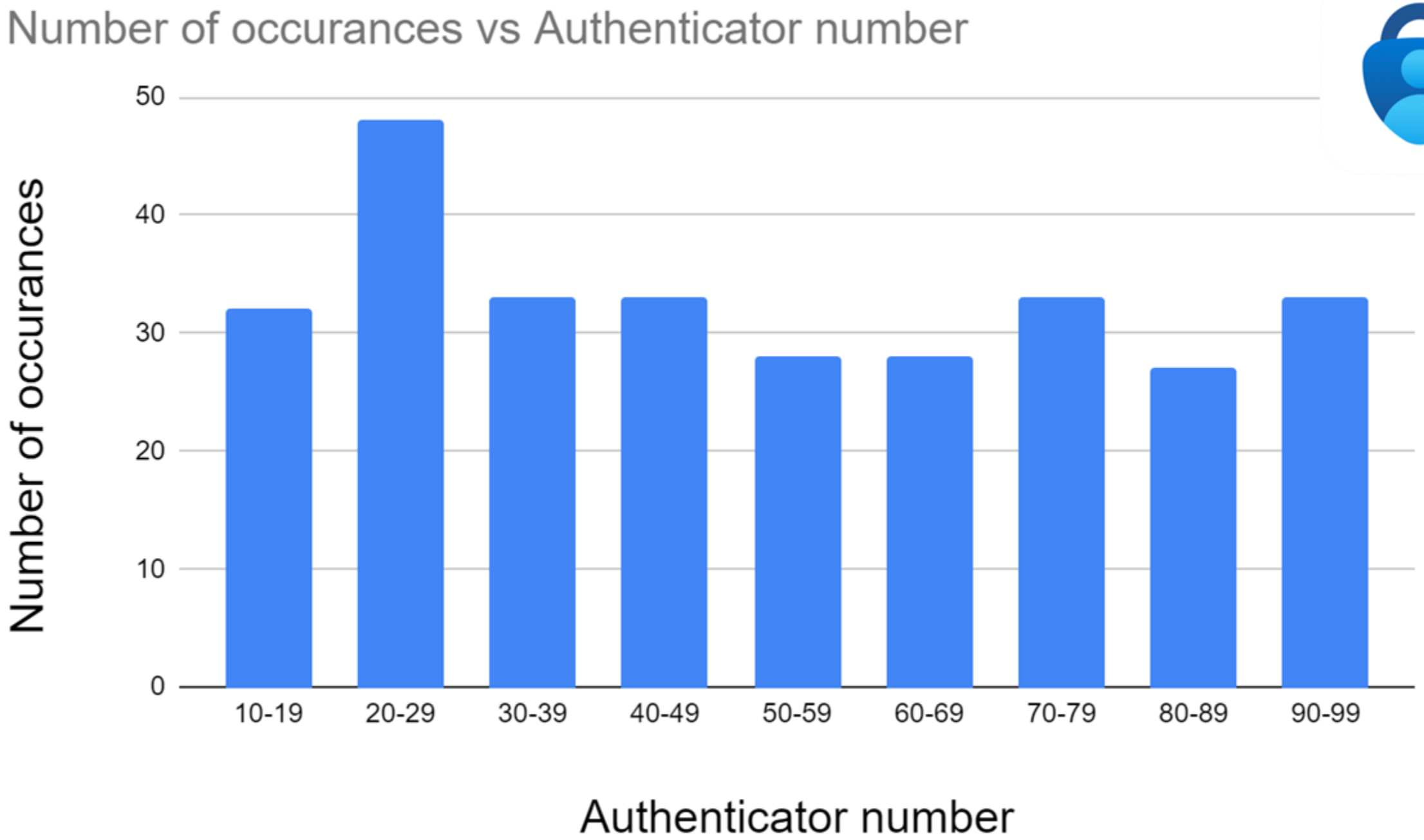
Water, Milk, Bag
Milk, Water, Bag
Bag, Milk, Water
Water, Bag, Milk
Milk, Water, Bag
no stress just vibes
(Do not erase)

Results

	0	10	20	30	40	50	60	70	80	90	SUM
0		4	4	2	4	2	3	1	2	3	25
1		5	4	3	2	5	2	2	6	3	32
2		2	4	2	2	3	2	2	2	2	21
3		4	7	4	3	1	3	5	3	3	33
4		6	5	5	2	2	1	3	2	3	29
5		2	8	3	4	3	2	4	1	2	29
6		4	2	4	2	2	3	5	3	3	28
7		1	5	2	8	2	2	3	4	4	31
8		1	5	5	4	5	5	4	2	2	33
9		3	4	3	2	3	5	4	2	8	34
SUM		32	48	33	33	28	28	33	27	33	295

- Most common numbers – 25, 47, 99
- Least common numbers – 17, 18, 53, 64, 70
- Total number of logins - 295




Number of occurances vs Authenticator number
50
40
30
20
10
0
Number of occurances
10-19
20-29
30-39
40-49
50-59
60-69
70-79
80-89
90-99
Authenticator number

Conclusions

- Choose the number 25!