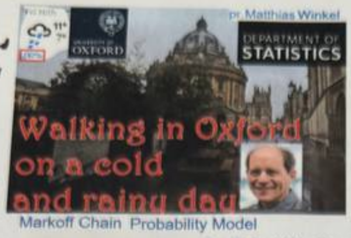
$(a+b)^3$ (+0.1) + 0.1 to Fin Grade
+ 0.1 to Final Exam

+0.1
for Handout
2025.02.04

+0.1
for A

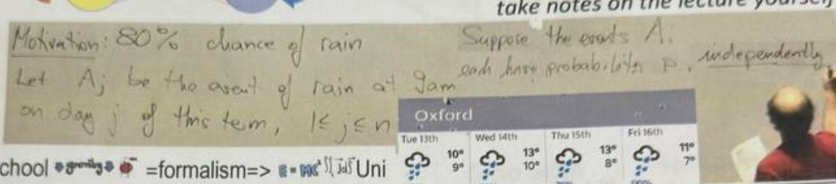
+0.1
3.5.25



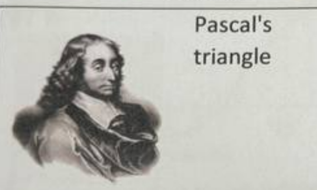
0.2

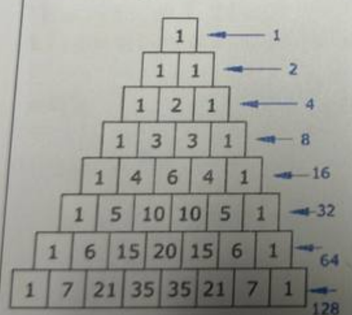
CHALK+TALK ink+think

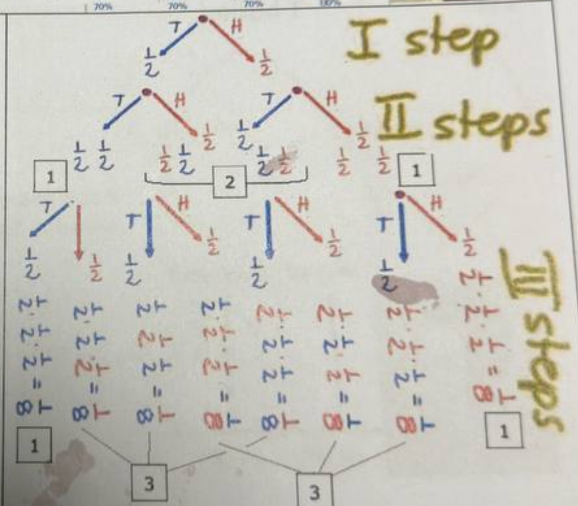
take notes on the lecture yourself



School =formalism=> Uni







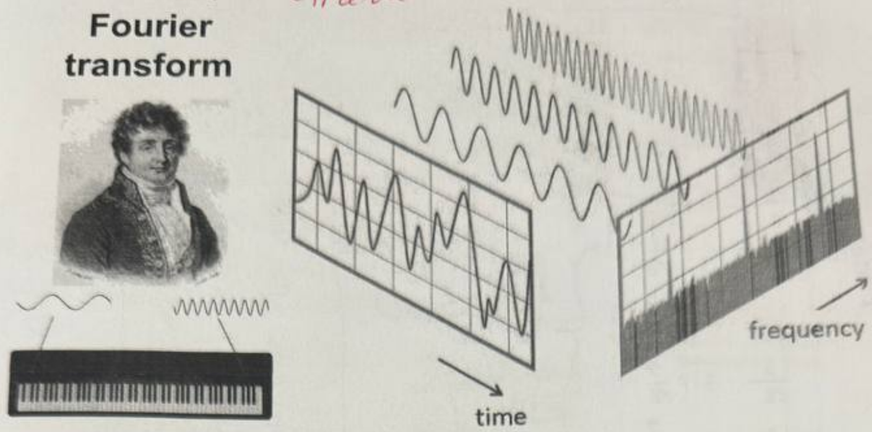
$$(a+b)^0 = 1$$
$$(a+b)^1 = a+b$$
$$(a+b)^2 = a^2 + 2ab + b^2$$
$$(a+b)^3 = a^3 + 3a^2b + 3ab^2 + b^3$$
$$(a+b)^4 = a^4 + 4a^3b + 6a^2b^2 + 4ab^3 + b^4$$
$$(a+b)^5 = a^5 + 5a^4b + 10a^3b^2 + 10a^2b^3 + 5ab^4 + b^5$$
$$(a+b)^6 =$$

+0.1
to Final

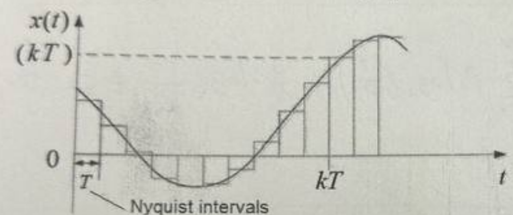
+0.1 to Final Exam Les Misârables

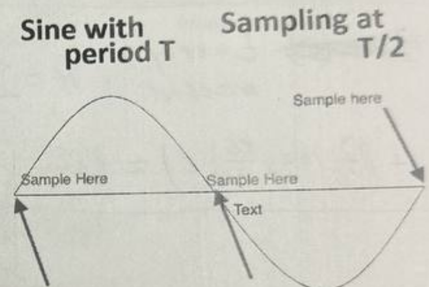
+0.1 to fin Grade 6.5.25
+0.1 to fin Grade

Fourier transform

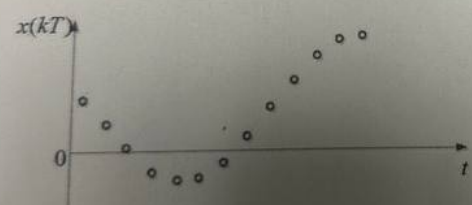


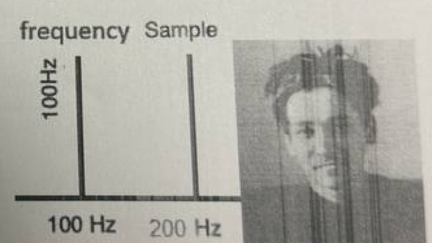
Sampling. Kotelnikov-Nyquist Theorem

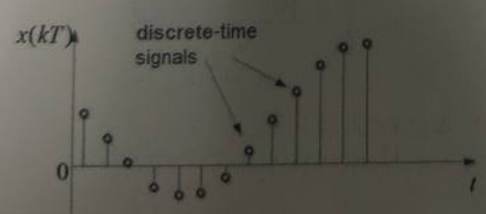




Time intervals T, through which readings s (kT) are taken, are called Nyquist intervals.







$$F_{sample} >= 2 * F_{max}$$

$$(T_{sample} <= T_{min}/2)$$

Total 16

$\frac{6}{16} \cdot 1 = \frac{6}{16}$

$\frac{4}{16} \cdot 2 = \frac{8}{16}$

$\frac{3}{16} \cdot 3 = \frac{9}{16}$

$\frac{3}{16} \cdot 3 = \frac{9}{16}$

$\Rightarrow \frac{32}{16} = 2$

$\frac{2}{8} \cdot 1 = \frac{2}{8}$

$\frac{2}{8} \cdot 2 = \frac{4}{8}$

$\frac{2}{8} \cdot 3 = \frac{6}{8}$

$\frac{2}{8} \cdot 3 = \frac{6}{8}$

Total: $\frac{18}{8}$ = (2,2)

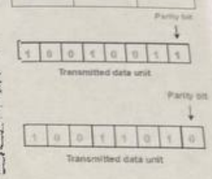
Entropy:
$0{,}25 \cdot \log_2 4 +$
$+ 0{,}25 \cdot \log_2 4 +$
$\ldots = (2)$

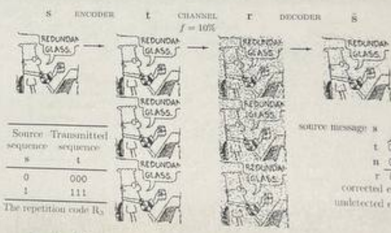
~~[illegible]~~ Entropy method: $H = \sum_{i=1}^{N} p_i \log_2\left(\frac{1}{p_i}\right) = \frac{6}{16} \cdot \log_2 \frac{16}{6} + \frac{4}{16} \cdot \log_2 \frac{16}{4} +$

$+ \left(\left(\frac{3}{16} \log_2 \frac{16}{3}\right) \cdot 2\right) \approx 1{,}94$

Sir **Dr. D. MacKay**,
University of Cambridge
(22 April 1967 – 14 April 2016)

"I believe in clean energy,
but I also believe in mathematics"



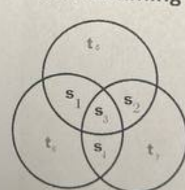


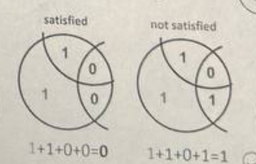
Source sequence s	Transmitted sequence t
0	000
1	111

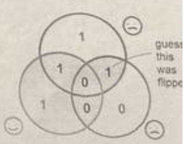
The repetition code R_3

source message s	0	0	1	0	1	1	0
t	000	000	111	000	111	111	000
n	000	001	000	000	101	000	000
r	000	001	111	000	010	111	000
corrected errors		*					
undetected errors					*		

7.4. Hamming code. $\frac{4}{\Sigma} \rightarrow \frac{7}{t}$



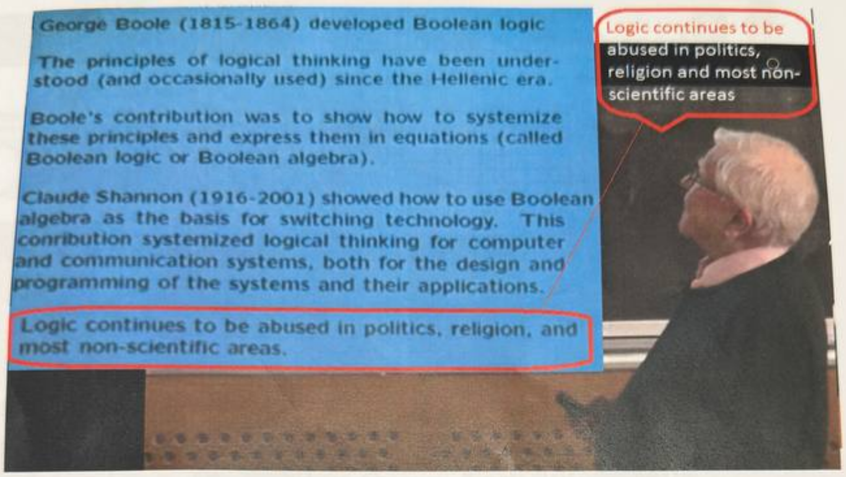


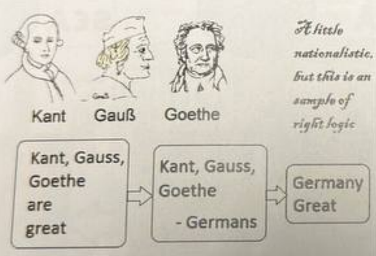


+0,5 to fin Grade Δ AO@dot.net.by Тема для переделки

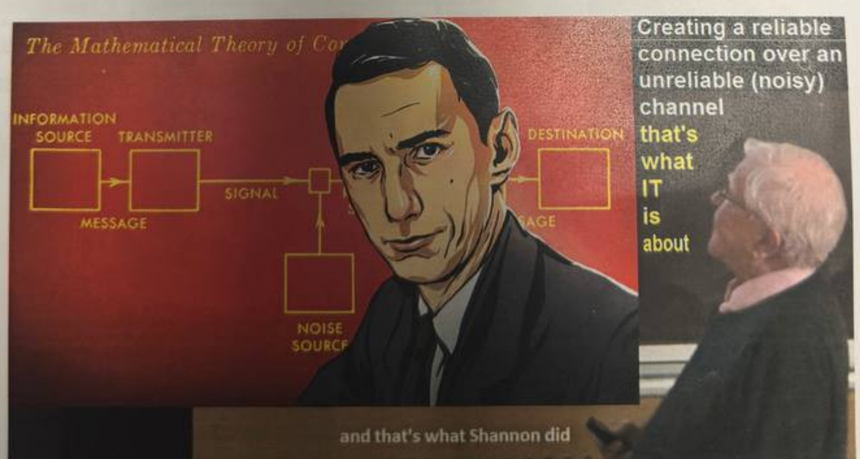
Resume of Lecture by Pr. Bob Gallagher from MIT

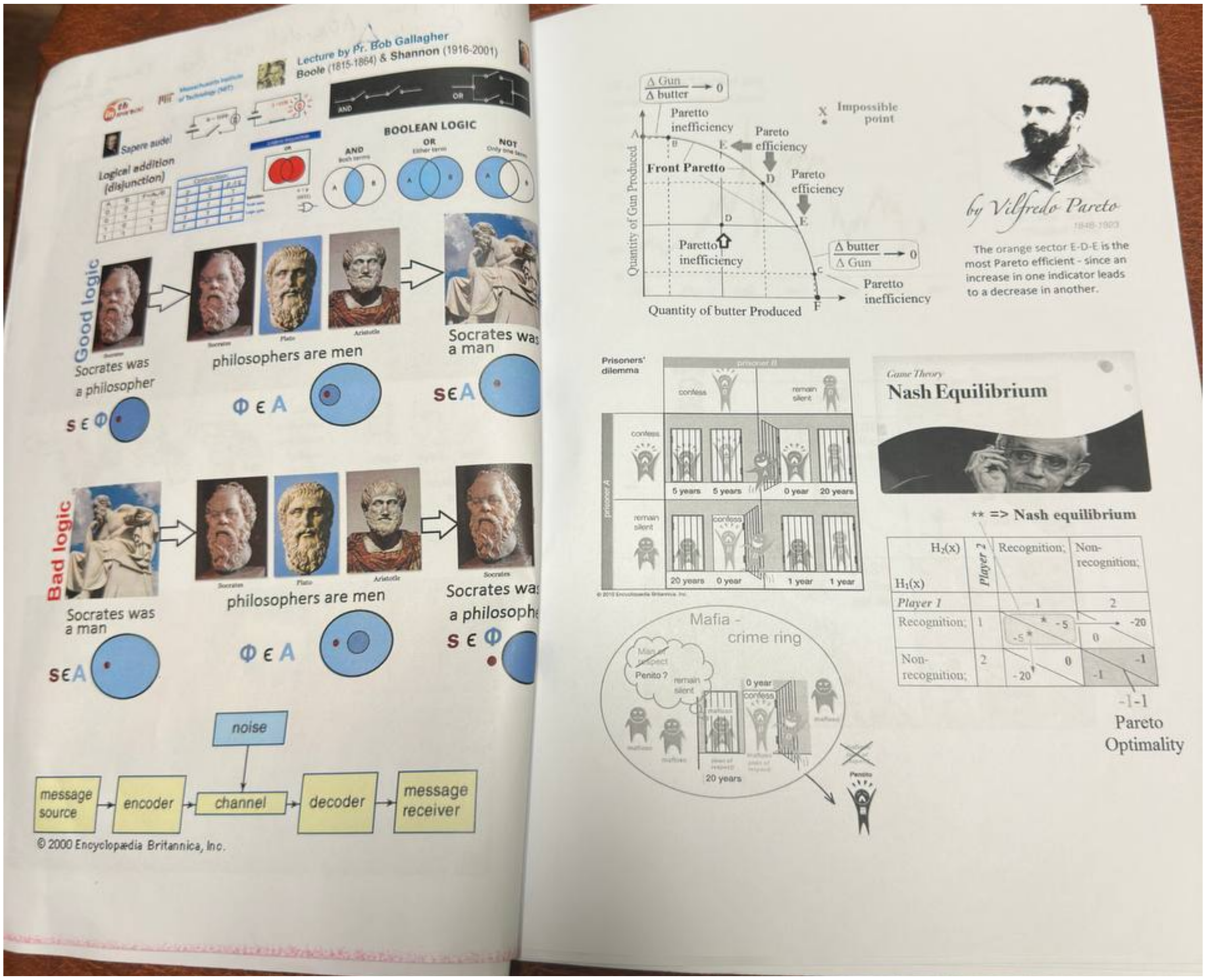
Massachusetts Institute of Technology (MIT)





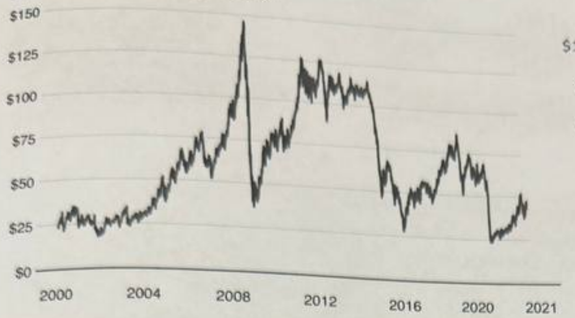
Bad logic (abuse of logic)

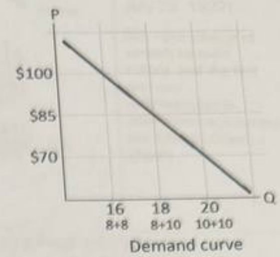



Lecture by Pr. Bob Gallagher
Boole (1815-1864) & Shannon (1916-2001)
Sapere aude!
Logical addition (disjunction)
BOOLEAN LOGIC
AND
OR
NOT
AND
OR
Good logic
Socrates was a philosopher
philosophers are men
Socrates was a man
s ϵ Φ
Φ ϵ A
s ϵ A
Bad logic
Socrates was a man
philosophers are men
Socrates was a philosophe
s ϵ A
Φ ϵ A
s ϵ Φ
noise
message source
encoder
channel
decoder
message receiver
© 2000 Encyclopædia Britannica, Inc.
Δ Gun / Δ butter → 0
Paretto inefficiency
Impossible point
Pareto efficiency
Front Paretto
Pareto efficiency
Quantity of Gun Produced
Paretto inefficiency
Δ butter / Δ Gun → 0
Paretto inefficiency
Quantity of butter Produced
by Vilfredo Pareto
The orange sector E-D-E is the most Pareto efficient - since an increase in one indicator leads to a decrease in another.
Prisoners' dilemma
prisoner B
confess
remain silent
prisoner A
confess
5 years
5 years
0 year
20 years
remain silent
confess
20 years
0 year
1 year
1 year
Game Theory
Nash Equilibrium
** => Nash equilibrium
H₂(x)
Player 2
Recognition;
Non-recognition;
H₁(x)
Player 1
Recognition;
Non-recognition;
-1-1
Pareto Optimality
Mafia - crime ring
Penito ?
remain silent
0 year
confess
20 years

Oil price hits 18-year low

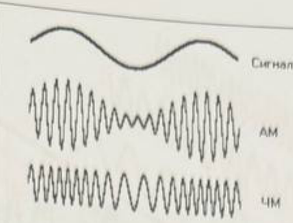
Brent crude, US dollars per barrel





Barrel	1. $8\cdot10^6$ barrels/day	2. $10\cdot10^6$ barrels/day
1. $8\cdot10^6$ barrels	Russia: $800 millions per day; $100 per barrel; Saudi Arabia: $800 millions per day	Russia: $850 millions per day; $85 per barrel; Saudi Arabia: $680
2. $10\cdot10^6$ barrels/day	Russia: $680 millions per day; $85 per barrel; Saudi Arabia: $850 millions per day	Russia: $700 millions per day; $70 per barrel; Saudi Arabia: $700 millions per day

Reginald A. Fessenden
(October 6, 1866 – July 22, 1932)

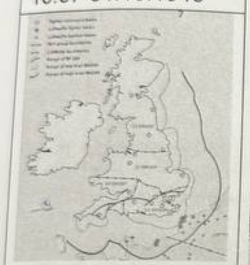


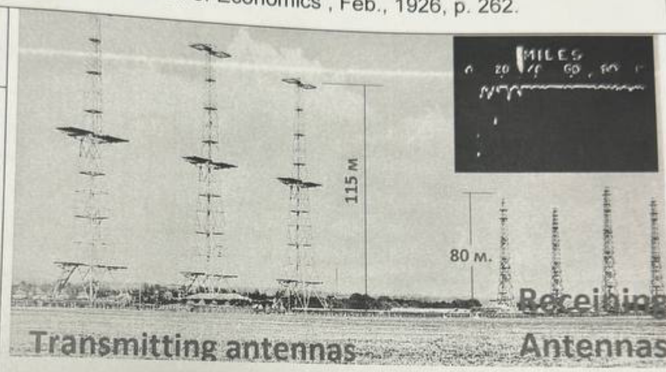
(October 6, 1866 – July 22, 1932)

first transmission of speech by radio (1900), and the first two-way radiotelegraphic communication across the Atlantic Ocean (1906)

"Ни одна организация, занимающаяся какой-либо конкретной областью деятельности, никогда не изобретает какие-либо важные разработки в этой области или не внедряет какие-либо важные разработки в этой области до тех пор, пока она не будет вынуждена сделать это из-за внешней конкуренции.." Oxford University Press. The Quarterly Journal of Economics , Feb., 1926, p. 262.

Battle of Britain
(3 month 3 weeks)
10.07-31.10.1940





Radar played a major role in the Battle of England

H. Nyquist

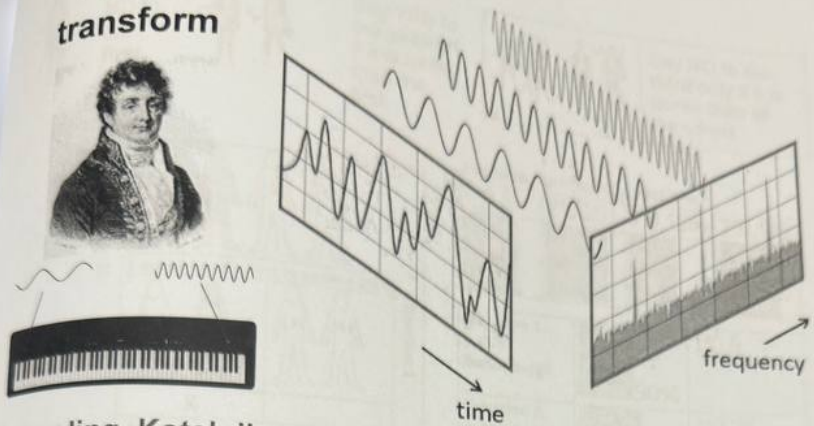
$$W = K \log m$$

Where W is the speed of transmission of intelligence,
m is the number of current values,
and, K is a constant.

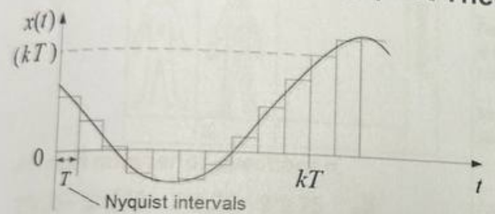
Ralph **Hartley**
(81:1888-1970)

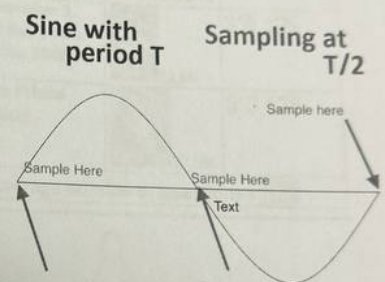
$$H = n \log s$$
$$= \log s^n.$$

Fourier transform

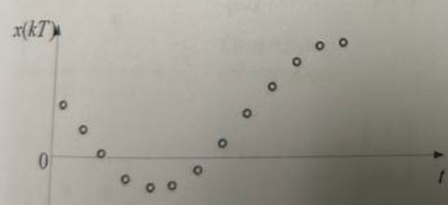


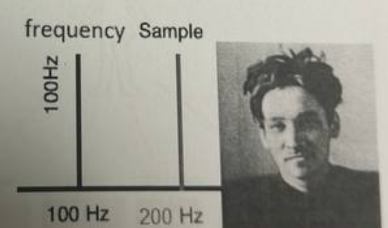
Sampling. Kotelnikov-Nyquist Theorem

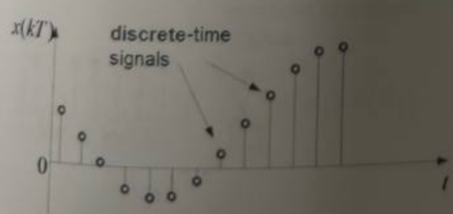




Time intervals T, through which readings s (kT) are taken, are called Nyquist intervals.





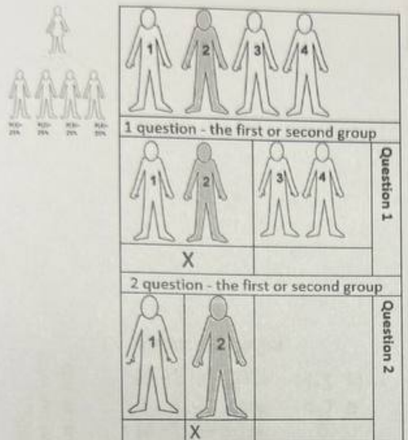


$$F_{sample} >= 2 * F_{max}$$
$$(T_{sample} <= T_{min}/2)$$

Say NO to the **first**

Say YES to the **second** if it is better than the first

Say NO to the **third** only if it is worse than all the others



Average number of questions =

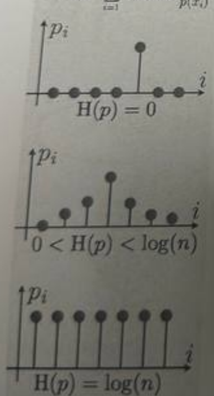
2*0.25+ **2***0.25+ **2***0,25+ **2***0,25 =2

Average number of questions =

1*0.5+	2*0.25+	3*0,125+	3*0,125

Question 1. Is this Zuckerberg?		50%	1*0.5
Question 2. Is this Sergey Brin?		25%	2*0.25
Question 3. Is this Stefan from BMW?		12,5%	3*0,125
So Prince Saud		12,5%	3*0,125
Average number of questions =**1,75**			

$$H(X)=\sum_{i=1}^{n} p(x_i)\log_b \frac{1}{p(x_i)}$$



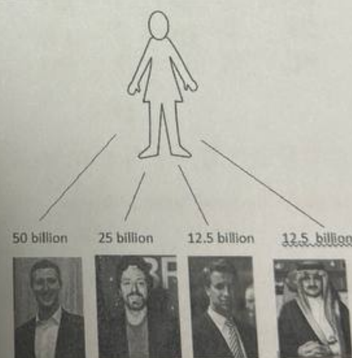
$$\sum_{i=1}^{n} p(i)\log_2 \frac{1}{p(i)}$$

Quantifying information

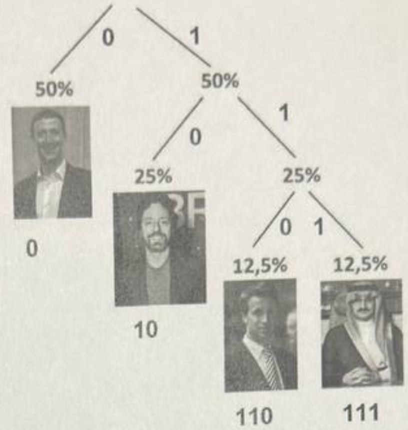
$$I(x_i)=\log_2\left(\frac{1}{p_i}\right)$$

number of bits required to encode choice

$$\sum_{i=1}^{n} p(x_i)\, I(x_i)$$



Mark Zukerberg	Sergey Brin	Stefan Quandt	Prince Al Saud
P(1)= **50%**	P(2)= **25%**	P(3)= **12,5%**	P(4)= **12,5%**



First-order approximation (symbols independent but with frequencies of Belarusian txt).

Мама мыла ра

М - 3	30%	1-3 М
а - 4	40%	4-7 а
ы - 1	10%	8 - ы
л - 1	10%	9 - л
р - 1	10%	10 - р
10		

лла мам ма р

Second-order approximation (digram (2-symbols) structure as in Belarusian)

Мама мыла ра

Ма - 2	22%	1-2	ма
ам - 2	22%	3-4	ам
мы - 1	11%	5	мы
ыл - 1	11%	6	ыл
ла - 1	11%	7	ла
ар - 1	11%	8	ар
ра - 1	11%	9	ра
9			

0. 4 6 7 3 1 9 1 6 7 3 5

ам ыл ла ам ма ра ма ыл ла ам мы

мылла рама

Logic

Bad logic

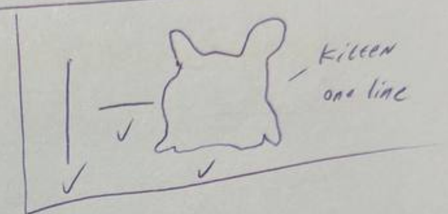
⊙ → ⊙ → ● costs

2 tr. $ today → for education

T → F → F

conjuction

+0,2 to fin Exam



Avg num?

□□□□□ → 5 Blue
□□ → 2 Red
□□ → 2 Black
■ → 1 Black-Bold

Total - 10 cards (With Bold)
9 cards (Without Bold)

Blue: $\frac{5}{10} = 0,5$ (50%)
Red: $\frac{2}{10} = 0,2$ (20%)
Black = $\frac{2}{10} = 0,2$ (20%)
Black-Bold - $\frac{1}{10} = 0,1$ (10%)

Entropy method. $H = -\sum p_i \log_2(p_i)$ or $\sum p_i \log_2\left(\frac{1}{p_i}\right)$

⇓

$-(0{,}5 \log_2 0{,}5 + (0{,}2 \log_2 0{,}2) \cdot 2) + 0{,}1 \log_2 0{,}1) \approx$ bin ≈ 1,8 ques.

Simple method: $0{,}5(n-(n-1)) = 0{,}5$ → Number of order of a question
$n = 3$
$0{,}2 \cdot 2 = 0{,}4$
$0{,}2 \cdot 3 = 0{,}6$
$0{,}1 \cdot 3 = 0{,}3$

Sum: 1,8

$0.5 \cdot \log\left(\frac{1}{0.5}\right) + 0.2 \log\left(\frac{1}{0.2}\right) +$

$0.5 \cdot 1$ $0.2 \cdot 2$

$5 \cdot 5 = 25$
$6 \cdot 6 = 36$
$7 \cdot 7 = 47^{+1}$ ← 10%
49

$F_s >= 2 \cdot F_{max}$
$(T_s <= T_{min}/2)$

1
1 1
1 2 1
1 3 3 1
1+4+6+4+1
1+5+10+10+5+1
1 6 15 20 15 6 1
1+7+21+35 35 21 7 1
1 8 28 56 70 56 28 8 1

$(a+b)^6 =$
$a^6 + 6b a^5 + 15b^2 a^4 + 20b^3 a^3 + 15b^4 a^2 + 6b^5 a^1 + b^6$

$(a+b)^7 = a^7 + 7a^6 b + 21a^5 b^2 + 35a^4 b^3 + 35a^3 b^4 + 21a^2 b^5 + 7a^1 b^6 + b^7$

$p(A) = \frac{m_1! \cdot m_2!}{n!}$ - Binominal Distribution

Arrangements are indistinguishable in objects

AAA BCD } 6!
↓ ↓
(AAA) ($A_1 A_2 A_3$)
Indisting. disting.

$\frac{6!}{3!}$ ⇒ Number of comb. order = 4

ABBAT = $\frac{5!}{2! \cdot 2! \cdot 1!}$

$\frac{4!}{2!} \Rightarrow \frac{4!}{2! \cdot 2!}$

$\frac{n!}{m_1! \cdot m_2! \cdot \ldots \cdot m_k!}$ ⇒ $\frac{n!}{m!(n-m)!}$ - Final Formula

XOR	x
00	0
01	1
10	1
11	0

&	
00	0
01	0
10	0
11	1

XOR	
00	0
01	1
10	1
11	1

```
cmd d:
cd IT Projects\0
Class Boole
{...
}
```