Visual Mathematics & Danilin Russians formulas

1. Reliability and probability of probability

Givenned probability of event and reliability is set and it is required to calculate normal number of identical events in a row.
P is probability of an event, for example, 25% = 0.25 = 25/100 = 1/4.
C - reliability of event is guaranteed, for example, 99% =0.99 = 9/10.

Multiplication of constant probabilities

C+(1-P)^N=1 [1]

calculates probability of probability and creates a formula

N = LOG(1-C)/LOG(1-P) [2]

Example: with a reliability of C=99% for a probability of P=25%
Normal number of identical consecutive N = LOG(1-0,99)/LOG(1-0,25) = 16
and means that it is normal to fail to guess 16 times in a row at a probability of 25% and real mathematicians understand why they write LOG or LN in different cases.

Relations are interchangeable as wins and losses and probability of winning is one minus probability of losing then C=1-c and c=1-C and P=1-p and p=1-P and same formulas are valid for probability and reliability over 50%.

Formula calculates it in a simplified way N = 7+(5*(1/P-2)) [3]
Example, P=0.1 N= 47 is normal and P=0.78 & N=4 is normal.

Calculate probability of event having provided reliability for given number event

P = 1 - (1-C)^(1/N) [4]

2. Salary

Let's say several employees receive a small salary and 1 manager receives a large salary and you need to find number of employees to form a given average salary.

Let's denote: B = big pay and C = average pay and M = small pay and H = number of employees who receive little and means

(B+M*H)/(H+1)=S [5]

Mtsensk Mzensk integral formula: H = (B-S)/(S-M) [6]

Note: Excel compatible programs allow you to assign any names to cells to right of formula line, and formulas in Russian are possible.
Example: B = 300 & M = 28 & S = 45 and means H = (B-S)/(S-M) = (300-45)/(45-28) = 255/17 = 15 person and verification: =(300+28*15)/(15+1)= 45.

Note: Mathematical programs calculate opposite H = (S-B)/(M-S).
Note: mathematical formulas can be designed as tables.

3. Inflation

Inflation in power of years calculates price multiplier

Inflation ^ Years = Factor [7]

Inflation: Inflation = Factor ^ (1 / Years) [8]

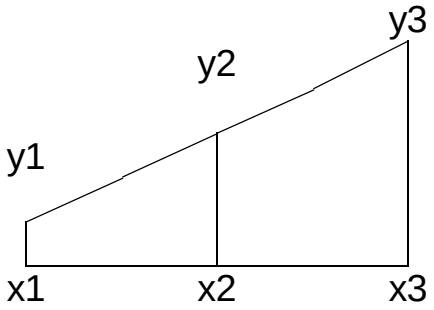
Years Years = LOG(Factor)/LOG(Inflation) [9]

Example: if multiplier is 12 for 15 years: inflation =12^(1/15) = +18%.

Example: if multiplier is 12 and inflation is 1.18: =LOG(12)/LOG(1.18) = 15 years.

№ 4. Interpolation

Variables ranked and created trapezoid x1 y1 y3 x3 and find: y2 by x2.



y1	y2	y3
50	78	90
20	48	60
x1	x2	x3

y2=y1+(x2-x1)*(y3-y1)/(x3-x1) [10]

Note: interpolation possible through graphic programs.

Note: possible interpolation of tables: 4-th cell and wholly.

№ 5. Combination

Practically: transport problem. N = X * (X-1) / 2 [11]

		A	B	C	D		
B		AB					A D
C		AC	BC				
D		AD	BD	CD			B C
E		AE	BE	CE	DE		

X=5 a b c d e N=5*4/2=20/2=10 ab ac ad ae bc bd be cd ce de

№ 6. Percents

Placed money under p % on Y years expect multiplier M. M = (1+p/100)^Y [12]

Percents p = -100*(1 -M^(1/Y)) or p = 100*(M^(1/Y)-1) [13]

Years Y = LOG(M)/LOG(1+p/100) [14]

7. Pattern

Binary events are massively controlled by multiplying events including function =NOT()

X = (A1 | NOT(A1)) ... * ... * (AN | NOT(AN)) = (0 | 1) [15]

Example: find number of events of form 1010011 summing up results:

=A1 *NOT(A2) *A3 *NOT(A4) *NOT(A5) *A6 *A7 = (0 | 1)

Note: bigdata may not be consecutive.

№ 8. Catcing-up

If coefficient K: rate multipler M: M=1+(1/(K-1)) [16]
If coefficient K =3 rate multipler minimum M=1+(1/(3-1))=1,5.

9. Winning

Integral is equal to sum of products of probabilities by coefficients.

V = P1*K1 + P2*K2 + … + PN*KN [17]

Example: guessing probability of 6% coefficient 10 and guessing probability of 38% coefficient 1 means V = 0,06*10 + 0,38*1 = 0,98 = 98%
Example Excel: =10*hypgeomdist(2;2;20;80)+1*hypgeomdist(1;2;20;80) =0,981
Example Excel: =2*hypgeomdist(1;1;18;37) =3*hypgeomdist(1;1;12;37) =0,973
Numbers of combinations Excel: =1/hypgeomdist(5;5;5;36) =376992
Note: it is convenient to compare many lotteries.

10. Winning of dependent events

Determine profitability of a set of dependent events by knowing coefficients
Formulation: sum of coefficients divided by square of quantity must greater than one

(K1 + K2 + ... + KN) / (N^2) > 1 [18]

Example: =(2,4+2)/(2^2) = 4,4 / 4 = 1,1 > 1 this means that it is winning when betting on both events, provided that one of events wins.
Note: most LOGical application: betting on elections or betting on events with many options of type "victory in 1st half and in match".
Note: name of dating system comes from name of country.
Note: it is better to understand simple fractions of form third and quarter or 5/4 & 4/5.

11. Winning of opposite events

Determine winning of several opposite events, which is called a "fork".
Formulation: product of coefficients minus each coefficient must be greater than zero.

K1 * K2 -K1 -K2 > 0 [19]

Example: = 1,2 * 8 -1,2 -8 = 0,4 > 0 so there is a "fork" and there is a win.
Note: a mathematical curiosity for winnings if there are 2 options.

Derivative

Derivative: tangent of slope angle of tangent of graph of function.

Derivative 1st: minimax of function.
Visually: horizontal tangent graph of function.
Derivative 2nd: inflection of function.
Visually: changing direction of angular movement of tangent of graph.

Path and derivative of 1st: speed.
Derivative 2nd: acceleration and derivative 3rd: start.

Visual Mathematic

Mathsolver

mathsolver.microsoft.com/ru/solve-problem/%60frac%7B%20%20%60left(%20B%2BM%20%60cdot%20%20H%20%20%60right)%20%20%20%20%7D%7B%20H%2B1%20%20%7D%20%20%20%3D%20%20S

mathsolver.microsoft.com/ru/solve-problem/`frac{%20 `left(B%2BM `cdot%20 H%20 `right)%20%20%20 }{ H%2B1%20 }%20%20 %3D%20 S

$$\frac{B+MH}{H+1}=S \quad \begin{cases} H=\frac{B-S}{S-M}, & B\neq M \text{ and } M\neq S \\ H\neq -1, & M=S \text{ and } B=M \end{cases}$$

НАЙДИТЕ Н

kenokeno.ucoz.ru/dng/msozpl.png

mathsolver.microsoft.com/ru/solve-problem/C+%7B%60left(1-P%60right)%7D%5E%7BN%7D%3D1

mathsolver.microsoft.com/ru/solve-problem/C-{`left(1-P`right)}^{N}%3D1

$$C+(1-P)^N=1$$

НАЙДИТЕ N

$$\begin{cases} N=\log_{1-P}(1-C) \\ N\in \mathrm{R}, \quad N>0 \end{cases}$$

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mathsolver.microsoft.com/ru/solve-problem/0.99%2B{`left(1-0.25`right)}^{N}%3D1

mathsolver.microsoft.com/ru/solve-problem/0.99%2B{`left(1-0.25`right)}^{N}%3D1

$$0.99+(1-0.25)^N=1$$

НАЙДИТЕ N

$$N=-2\log_{\frac{3}{4}}(10)\approx 16.008$$

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Keywords 27

ours	aliens	others
active	passive	saving
leader	slave	victim
life	machine	language
target	time	control
service	goods	quality
export	technology	exploitation
integral	logarithm	derivative
elite	antielite	priority

Decision of task about salaries

(B+M*H)/(H+1) = S

B+M*H = S*(H+1)

B+M*H = S*H+S

S*H-M*H = B-S

H*(S-M) = B-S

H = (B-S)/(S-M)

Mathematica

```
Mathematica for Windows
Solve [Inflat ^ Years == Factor , Inflat]
                                  1/Years
      Inflat -> Factor
 Solve [ Inflat ^ Years == Factor , Years]
                          Log[Factor]
        Years -> ----------------------
                          Log[Inflat]
```

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```
Mathematica for Windows    Danilin
In[5]:=    Solve [C+(1-p)^N==1, N]
                          Log[1 - C]
Out[5]=    N -> ----------------------
                          Log[1 - p]
```

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```
Mathematica for Windows
Solve [M == (1+p/100)^Y, Y]                    1/Y
                  Log[M]          p == -100(1 - M    )
Y == ----------------------------
                        p        Solve
      Log[1 + ----]              [M == (1+p/100)^Y, p]
                  100
```

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PhotoMath

$$0{,}99 + (1 - 0{,}25)^N = 1$$

Решите относительно N

$$N = -2\log_{\frac{3}{4}}(10)$$

$$N \approx 16{,}008$$

$$0{,}99 + (1 - 0{,}25)^N = 1$$

$$0{,}99 + 0{,}75^N = 1$$

$$0{,}99 + \left(\frac{3}{4}\right)^N = 1$$

$$\log_{\frac{3}{4}}\left(\left(\frac{3}{4}\right)^N\right) = \log_{\frac{3}{4}}(0{,}01)$$

Упростить выражение, используя $\log_a(a^x) = x$

$$N = \log_{\frac{3}{4}}(0{,}01)$$

$$= \log_{\frac{3}{4}}(10^{-2})$$

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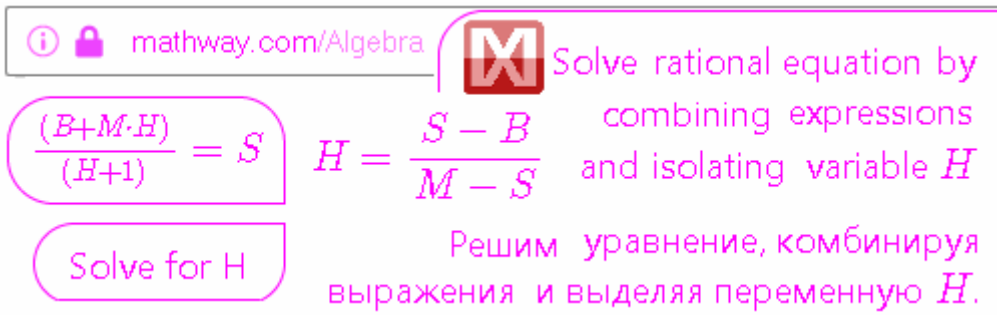
Events binary and 6 variants:

tracking & participation & success or failure (1&2)

tracking & non-participation & possible success or failure (3&4)

non-tracking & non-participation & possible success or failure (5&6)

MathWay



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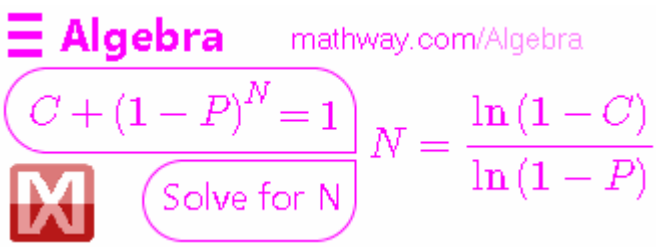

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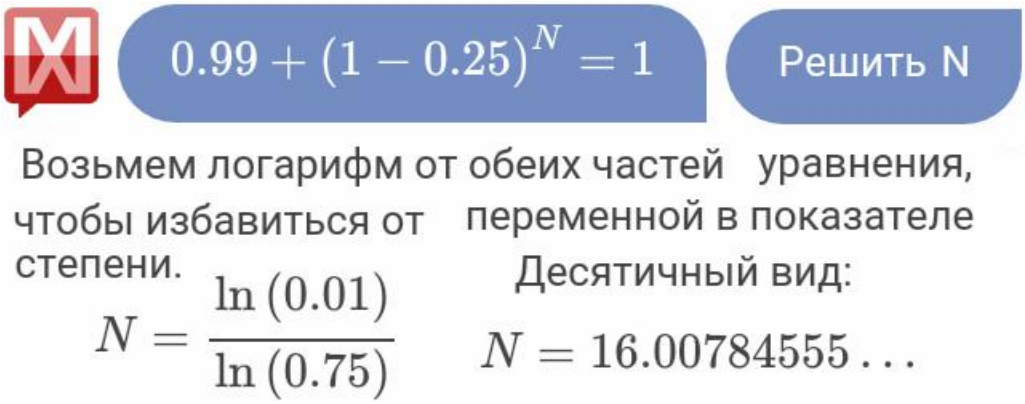

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Wolframalpha

wolframalpha.com/input/?i=solve+C%2B%281-p%29%5EN%3D1+for+N

C+(1-P)^N=1 solve for N

solve	$C + (1 - P)^N = 1$	for	N

$N > 0$ and $C = 1$ and $P = 1$

and $\log(1 - P) \neq 0$

and $C < 1$ and $P < 1$

$$N = \frac{\log(1 - C)}{\log(1 - P)}$$

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solve for p, c+(1-p)^n=1

solve	$c + (1 - p)^n = 1$	for	p

$$p = 1 - \sqrt[n]{1 - c}$$

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wolframalpha.com/input/?i=solve+%28B%2BM*H%29%2F%28H%2B1%29%3DS+for+H

solve	$\frac{B + M H}{H + 1} = S$	for	H

$$H = \frac{S - B}{M - S} \text{ and } M \neq S \text{ and } B \neq M$$

$H + 1 \neq 0$ and $M = S$ and $B = S$

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$$c + (1 - p)^n = 1$$

$$(1 - p)^n = 1 - c$$

$$\ln(1 - p)^n = \ln(1 - c)$$

log(b,z^a) = a·log(b,z)

$$n\ln(1 - p) = \ln(1 - c)$$

$$n = \frac{\ln(1 - c)}{\ln(1 - p)}$$

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