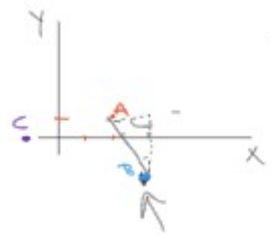
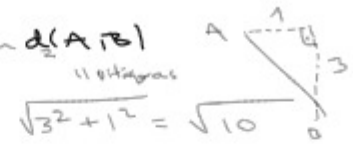
Exercises in german

1. Distance between points



A = (2,1)
B = (3,-2)
C = (-1,0)

Euclidean $d_2(A,B)$ — Manhattan



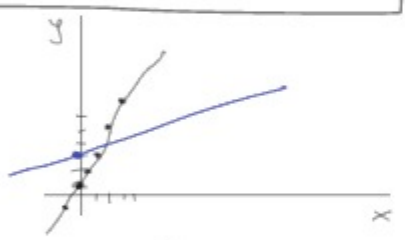
$\sqrt{3^2+1^2} = \sqrt{10}$

d(A,C)

d(B,C)

$d_1(A,B) = 3+1 = 4$

2. Basic Functions



2.2. Linear Function

$y = 2x+1$

slope — y-intercept

$y = m \cdot x + n$

x	y
0	1
1	3
2	5
3	7
4	9
-1	-1
0'5	2

$y = \frac{1}{2}x + 3$

$y = -3x + 8$

$y = 1'80 \cdot x$

extras luz

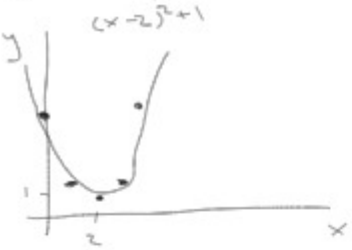
$y = 30 \cdot x + 20$ (inguilino)

x	y
0	20
1	50
2	80
3	110

3. Polynomials

$y = x^2 - 4x + 5$

$(x-2)^2 + 1$

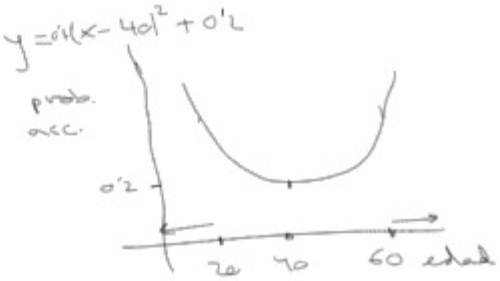


x	y
0	5
1	2
2	1
3	2
4	5

$y = (x-a)^2 + b$

(a,b) vertex

$y = 0'1(x-40)^2 + 0'2$



$y = x^4 - 7x^2 + 3x - 11$

2.4. Square root

$\sqrt{100} = \pm 10$

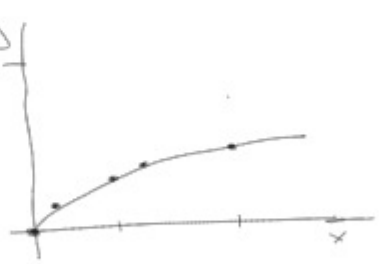
$\sqrt{1} = \pm 1$

$\sqrt{9} = \pm 3$

$\sqrt{0'01} = 0'1$

$\sqrt{a} = b \iff a = b^2 = b \cdot b$

$y = \sqrt{x}$



x	y
0	0
1	1
4	2
9	3
16	4
25	5
5	$\sqrt{5}$

5. Exponential

I_n = invested day n

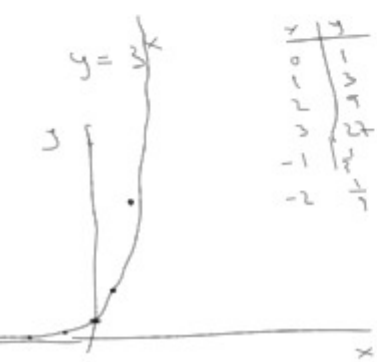
$I_n = 1 \cdot I_{n-1} + 0'1\, I_{n-1} = 1'1\, I_{n-1}$

$I_{n+1} = 1'1\, I_n = 1'1^2 \cdot I_{n-1}$

$I_{n-2} = 1'1^2 \cdot I_n$

$I_{n+10} = 1'1^{10} \cdot I_n$

$y = 3^x$



x	y
0	1
1	3
2	9
3	27
-1	$\frac{1}{3}$
-2	$\frac{1}{9}$

2.6. Logarithm

$10^3 = 1000$

2.6. Logarithm

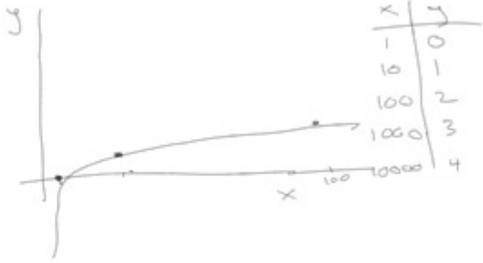
$10^3 = 1000$

$3 = \log_{10}(1000)$

$4 = \log_{10}(10000)$

$\log_2 16 = 4$

$y = \log_{10}(x)$



x	y
1	0
10	1
100	2
1000	3
10000	4

$\log(a \cdot b) = \log a + \log b$

$\log\left(\frac{a}{b}\right) = \log a - \log b$

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27. $\sum_{n=3}^{6} n = 3+4+5+6$

special symbols

$\sum_{n=-2}^{2} (n^2+n+1) = (4-(-2)+1)+(1+1^2+1+1)+\dots+(4-2+1)$

$\sum_{n=0}^{4} a_n x^n = a_0 + a_1 x + a_2 x^2 + a_3 x^3 + a_4 y$

Combinatorics

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1.

SC
SA
CS
CA
AS
AC

$2 \cdot 20 = 420$

3. ${}^5C_2 = \frac{5!}{3!2!} = \frac{5 \cdot 4}{2} = 10$

$\frac{5 \cdot 4}{2} = \frac{20}{2} = 10$

2.

$24 = 4!$

Probabilidad

00000 ⟶ 99999

100.000

$\frac{1}{2}$

$p(1\ átomo) = \frac{1}{100.000}$

	1	2	3	4	5	6
1	✓					
2		✓				
3			✓			
4				✓		
5					✓	
6						✓

$\frac{6}{36} = \frac{1}{6}$

43
34

$\Omega = \{22, 34, 43$

$\{11, 12, 13, \ldots 16$
$21, 22, 23 \ldots$
0
$0, 6\}$

36

$p(A\sim) = \frac{2}{6}$

$p(\sim c) = \frac{2}{6}$

$p(A\sim \cup \sim c) =$

1. $p(10\ heads) = 0'8 \cdot 0'8 \cdots 0'8 = 0'8^{10}$

$p(0\ heads) = 0'2 \cdots 0'2 = 0'2^{10}$

HTTT ⟶ $0'8 \cdot 0'2 \cdot 0'2 \cdot 0'2$
THTT ⟶ $0'2 \cdot 0'8 \cdot 0'2 \cdot 0'2$ } $0'2^3 \cdot 0'8 \cdot 4$

$\binom{N}{1} = \frac{N!}{1!(N-1)!} = N$

H H

$p(1\ heads) = 0'8 \cdot 0'2^9 \cdot 10$

HHTTT ⟶ $0'8^2\ 0'2^3$
H THTT