

# Formulario general

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# Índice

<b>1. Algebra</b>	<b>5</b>
1.1. factorization . . . . .	5
1.2. Sintetic divition . . . . .	6
1.3. cubic differences . . . . .	7
1.4. general formula . . . . .	7
1.5. Logarithms . . . . .	7
<b>2. Boolean Algebra</b>	<b>8</b>
2.1. Simple Formulas . . . . .	8
<b>3. Complex Algebra</b>	<b>8</b>
3.1. Polar coordinates . . . . .	8
3.2. Basic identiies and formulas . . . . .	8
3.3. Euler identity . . . . .	9
3.4. Multiplicative cycles . . . . .	9
3.5. Graphs . . . . .	9
3.6. Triangle inequality . . . . .	10
3.7. Golden Triangle . . . . .	10
<b>4. Linear Algebra</b>	<b>10</b>
4.1. dot and cross product . . . . .	10
4.2. Crammer Rule . . . . .	11
4.3. Gauss jordan Algorithm . . . . .	11
4.4. simetry on matrices . . . . .	11
<b>5. Trigonometry</b>	<b>12</b>
5.1. Basic Identities . . . . .	12
5.2. Double Angle . . . . .	12

5.3.	Sin in terms of e . . . . .	12
5.4.	hyperbolic functions . . . . .	13
5.5.	square reduction . . . . .	13
5.6.	Polar Coordinates . . . . .	13
<b>6.</b>	<b>Diferential Calculus</b>	<b>16</b>
6.1.	basic formulas . . . . .	16
6.2.	Limits . . . . .	16
6.3.	Derivatives of inverse trigonometric functions . . . . .	16
6.4.	Derivatives of Hiperbolic functions . . . . .	16
<b>7.</b>	<b>Integral Calculus</b>	<b>17</b>
7.1.	basic integral formulas . . . . .	17
7.2.	Weirestrass substitution . . . . .	17
7.3.	Reduction formulas . . . . .	18
7.4.	integrals of Hiperbolic functions . . . . .	19
7.5.	Particular Integrals . . . . .	19
7.6.	Taylor series . . . . .	19
7.7.	Riemann z function . . . . .	19
7.8.	Gamma Function . . . . .	20
<b>8.</b>	<b>Vector Calculus</b>	<b>20</b>
8.1.	basic formulas . . . . .	20
8.2.	3d Line equation . . . . .	20
<b>9.</b>	<b>Differential Ecuations</b>	<b>21</b>
9.1.	linearity . . . . .	21
9.2.	homogeneous ecuations . . . . .	22
9.3.	homogeneous function of grade n . . . . .	22
9.4.	Exact ED . . . . .	22

9.5. Bernouully ecuation . . . . .	22
9.6. Ricat Ecuation . . . . .	23
9.7. Cauchy Euler ecuation . . . . .	23
9.8. integrant factor . . . . .	23
9.9. Linear differential equations . . . . .	23
9.10. Order Reduction . . . . .	24
9.11. Constant coefficients Ecuation . . . . .	25
9.12. parameter variation . . . . .	25
9.13. Indeterminate Coeficients . . . . .	27
<b>10.probability and statistics</b>	<b>28</b>
10.1. Independent Events . . . . .	28
10.2. morgan laws . . . . .	28
10.3. separated probabilities . . . . .	29
<b>11.Numerical Calculus</b>	<b>30</b>
11.1. Taylor Polinomial . . . . .	30
11.2. Newton Raphson . . . . .	30
11.3. Complement to one . . . . .	30
11.4. complement to two . . . . .	30
11.5. complemento a dos . . . . .	30
11.6. convertir de punto flotante a decimal . . . . .	30
11.7. convert decimal to float . . . . .	32
11.8. Convert decimal fraction to float . . . . .	33
11.9. Fixed point iteration . . . . .	33
11.10 Divided differences . . . . .	34
11.11 Lagrange Polinomial . . . . .	34
<b>12.Arch Linux</b>	<b>35</b>
12.1. Mantainance . . . . .	35

12.2. Print in arch linux . . . . .	35
12.3. configure date and time . . . . .	36
12.4. Configure wireless . . . . .	36
12.5. mount devices . . . . .	37
<b>13.Latex</b>	<b>37</b>
13.1. commonly used special symbols . . . . .	37
13.2. Greek and Hebrew Letters . . . . .	38
13.3. math constructs . . . . .	38
13.4. Delimiters . . . . .	38
13.5. Variable Sized simbols . . . . .	39
13.6. binary operation relation symbols . . . . .	39
13.7. arrow symbols . . . . .	39
13.8. miscelanious . . . . .	40
13.9. Matrices . . . . .	40
<b>14.Electronics</b>	<b>41</b>
14.1. Logic Gates . . . . .	41
14.2. MinTerminos y max terminos . . . . .	41
<b>15.Physics</b>	<b>42</b>
15.1. Motion with constant acceleration . . . . .	42

# 1. Algebra

## 1.1. factorization

1. common factor
2. common factor by agroupation of terms
3. cubic differences
4. perfect square trinomial
5. trinomial of the form  $x^2 + bx + c$
6. trinomial of the form  $ax^2 + bx + c$
7. sum and difference of cubes
8. sintetic divition
9. general formula

## 1.2. Sintetic divition

Example:

$$x^3 - 5x^2 + 2x + 8$$

Taking the divisors of the independent term

$$p = D_8 = \{\pm 1, \pm 2, \pm 4, \pm 8\}$$

and the divisors of the term with the highest exponent

$$q = D_1 = \{\pm 1\}$$

$$p/q = \{\pm 1, \pm 2, \pm 4, \pm 8\}$$

now all the possibilities are in the space  $p/q$  that are integers

so:

$$\begin{array}{cccc|l} x^3 & x^2 & x & TI & \\ 1 & -5 & 2 & 8 & \\ & -1 & 6 & -8 & \\ \hline 1 & -6 & 8 & 0 & \end{array} \quad x = -1$$

then:

$$(x^2 - 6x + 8)(x + 1)$$

then:

$$(x + 1)(x - 4)(x - 2)$$

### 1.3. cubic differences

$$u^3 + 1 = (u^2 - u + 1)(u + 1)$$

$$u^3 - 1 = (u^2 + u + 1)(u - 1)$$

### 1.4. general formula

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

### 1.5. Logarithms

$$\log_a(p) = \frac{\log p}{\log a}$$



## 2. Boolean Algebra

### 2.1. Simple Formulas

$$AA' = 0, \quad A + A' = 1$$

$$AB + AC = A(B + C)$$

$$(AB...Z)' = A' + B' + ... + Z'$$

$$(A + B)(A + C) = A + BC$$

$$AB + AB' = A$$

$$(A + B)(A + C) = A + BC$$

$$A + A + B = A, \quad A(A + D) = A$$

$$(x + y)' = x'.y'$$

$$(x.y)' = x' + y'$$

## 3. Complex Algebra

### 3.1. Polar coordinates

$$(r, \theta)$$

## 3.2. Basic identities and formulas

Basic conversions:

$$y = r(\sin(\theta))$$

$$x = r(\cos(\theta))$$

$$r = \sqrt{x^2 + y^2}$$

$$\theta = \tan^{-1}\left(\frac{y}{x}\right)$$

Basic Formulas:

$$-i = \frac{1}{i}$$

$$Z = a + bi$$

$$\overline{Z} = a - bi$$

$$\overline{Z} + \overline{w} = \overline{Z + w}$$

$$\overline{Z} \times Z = |Z|^2$$

## 3.3. Euler identity

$$e^{iz} = \cos(z) + i \sin(z)$$

$$e^{\pi i} + 1 = 0$$

### 3.4. Multiplicative cycles

$$i = i$$

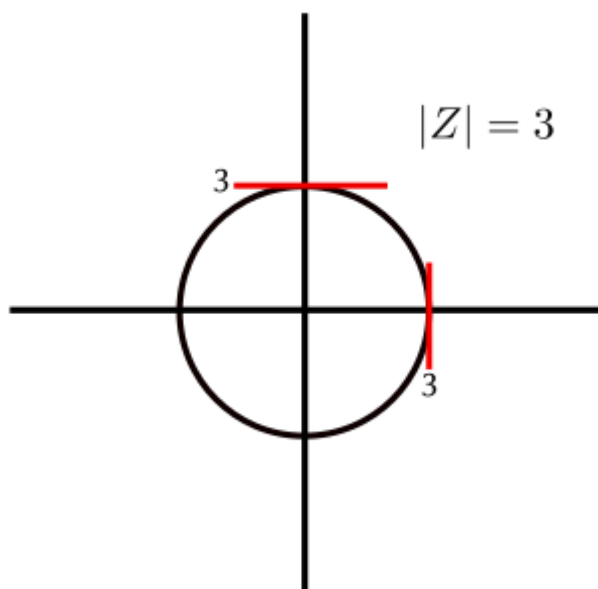
$$i^2 = -1$$

$$i^3 = -i$$

$$i^4 = 1$$

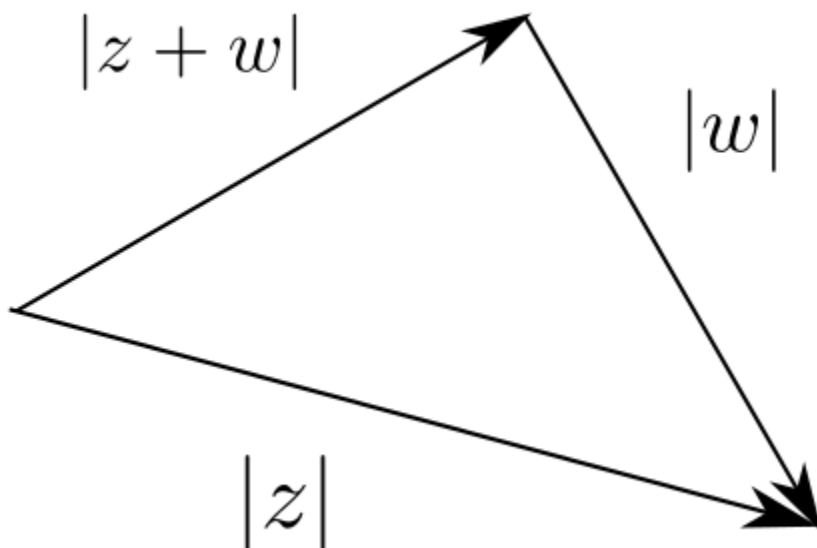
$$i^5 = i$$

### 3.5. Graphs



### 3.6. Triangle inequality

$$|z + w| \leq |z| + |w|$$



### 3.7. Golden Triangle

$$\frac{a}{b} = \frac{b}{a - b}$$

## 4. Linear Algebra

### 4.1. dot and cross product

$$|\vec{a} \times \vec{b}| = |\vec{a}||\vec{b}| \sin \theta$$

$$\vec{a}.\vec{b} = |\vec{a}||\vec{b}| \cos \theta$$

$$A^{-1} = \text{frac}(\text{adj} A)^T \text{def}(A)$$

## 4.2. Crammer Rule

$$x = \frac{\delta_x}{\delta_s}, \quad y = \frac{\delta_y}{\delta_s}, \quad z = \frac{\delta_z}{\delta_s}$$

## 4.3. Gauss jordan Algorithm

$$A^{-1} = \left( \begin{array}{cc|cc} a & b & 1 & 0 \\ c & d & 0 & 1 \end{array} \right)$$

## 4.4. simetry on matrices

## 5. Trigonometry

### 5.1. Basic Identities

$$\cos(\alpha) = \frac{1}{2}[\cos(\alpha - \beta) + \cos(\alpha + \beta)]$$

$$\sin(A \pm B) = \sin A \cos B \pm \cos A \sin B$$

$$\cos(A \pm B) = \cos A \cos B \mp \sin A \sin B$$

$$\sinh(x) = \frac{e^x - e^{-x}}{2}$$

$$\cosh(x) = \frac{e^x + e^{-x}}{2}$$

$$\sin(x) \cos(y) = \frac{1}{2}[\sin(x + y) + \sin(x - y)]$$

### 5.2. Double Angle

$$\sin(2\theta) = 2 \sin(\theta) \cos(\theta)$$

$$\cos(2\theta) = \cos^2 \theta - \sin^2 \theta$$

$$\cos(2\theta) = 2 \cos^2 \theta - 1$$

### 5.3. Sin in terms of e

$$\sin(x) = \frac{e^{ix} - e^{-ix}}{-2i}$$

$$\cos(x) = \frac{e^{ix} + e^{-ix}}{2}$$

## 5.4. hyperbolic functions

$$\cosh^2(x) - \sinh^2(x) = 1$$

$$\operatorname{sech}^2(x) + \tanh^2(x) = 1$$

$$\sinh(x \pm y) = \sinh(x) \cosh(y) \pm \cosh(x) \sinh(y)$$

$$\cosh(x \pm y) = \cosh(x) \cosh(y) \pm \sinh(x) \sinh(y)$$

## 5.5. square reduction

$$\sinh^2(x) = \frac{\cosh(x) - 1}{2}$$

$$\cosh^2(x) = \frac{\cosh(x) + 1}{2}$$

## 5.6. Polar Coordinates

$$r \cos(u) = x, \quad r \sin(u) = y$$

$$r^2 = x^2 + y^2$$

The symmetry around the x axis:

$$y - r = f(\theta) = f(-\theta)$$

The symmetry around the y axis:

$$r = f(\pi - \theta)$$

Symetry around  $\theta = \frac{\pi}{2}$

$$f(\pi - \theta) = f(\theta)$$

Symetry around the origin

$$f(\pi + \theta) = -f(\theta)$$

Find the type of graphic the next function is gonna make:

$$r = \pm a + b \sin(u)$$

$a < b$ cola	$a = b$ corazon pasa origen	$a > b$ sin cola
-----------------	--------------------------------	---------------------



Roses:

$$r = a \sin(n\theta), \quad r = \cos(n\theta)$$

1. number of petals

```
if(n %2 == 0)
{
    return 2n;
}
else
{
    return n;
}
```

2.  $angle = \frac{360^\circ}{\#petals}$

3. first petal

```
if(cos(x))
{
    return "x axis";
}
else
{
    return "theta = \pi / 2n ";
}
```

## 6. Diferential Calculus

### 6.1. basic formulas

$$(\tan(x))' = \sec^2(x), \quad (\csc(x))' = \csc(x)\cot(x)$$

$$(\sec(x))' = \sec(x)\tan(x), \quad (\cot(x))' = -\csc^2(x)$$

$$(\ln(x))' = \frac{1}{x}$$

$$(a^x)' = a^x \ln(a) * x'$$

$$\left(\frac{f(x)}{g(x)}\right)' = \frac{g(x)f(x)' - f(x)g(x)'}{(g(x))^2}$$

### 6.2. Limits

$$\lim_{x \rightarrow 0} \frac{\sin(x)}{x} = 1$$

### 6.3. Derivatives of inverse trigonometric functions

$$(\sin^{-1}(x))' = \frac{x'}{\sqrt{1-x^2}}, \quad (\cos^{-1}(x))' = \frac{-x'}{\sqrt{1-x^2}}$$

$$(\tan^{-1}(x))' = \frac{x'}{x^2+1}, \quad (\cot^{-1}(x))' = \frac{-x'}{x^2+1}$$

$$(\sec^{-1}(x))' = \frac{x'}{|x|\sqrt{x^2-1}}, \quad (\csc^{-1}(x))' = \frac{-x'}{|x|\sqrt{x^2-1}}$$

## 6.4. Derivatives of Hiperbolic functions

$$(\sinh(x))' = \cosh(x), \quad (\cosh(x))' = \sinh(x)$$

$$(\tanh(x))' = \operatorname{sech}^2(x), \quad (\coth(x))' = -\operatorname{csch}^2(x)$$

$$(\operatorname{sech}(x))' = -\operatorname{sech}(x) \tanh(x), \quad (\operatorname{csch}(x))' = -\operatorname{csch}(x) \coth(x)$$

## 7. Integral Calculus

### 7.1. basic integral formulas

$$\int \frac{1}{X} dx = \ln |x|$$

$$\int a^x dx = \frac{a^x}{\ln a}$$

$$\int \sin(x) dx = -\cos(x)$$

$$\int \cos(x) dx = \sin(x)$$

$$\int \tan(x) dx = \ln |\sec(x)| \text{ or } -\ln |\cos(x)|$$

$$\int \cot(x) dx = \ln |\sin(x)|$$

$$\int \sec(x) dx = \ln |\sec(x) + \tan(x)|$$

$$\int \csc(x) dx = \ln |\csc(x) - \cot(x)|$$

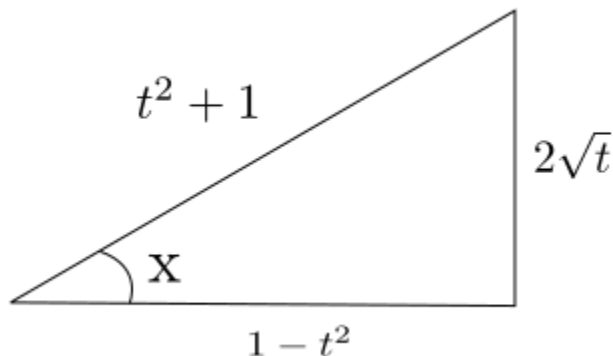
### 7.2. Weirestrass substitution

let  $t = \tan(x/2)$  where  $-\pi < x < \pi$  Then:

$$\sin(x) = \frac{2t}{1+t^2}$$

$$\cos(x) = \frac{1-t^2}{1+t^2}$$

$$dx = \frac{2dt}{1+t^2}$$



if all trigonometric functions are pairs then: let  $t = \tan(x)$  where  $-\pi < x\pi$  Then:

### 7.3. Reduction formulas

$$\int \sin^n(x) = -\frac{\sin^{n-1}(x) \cos(x)}{n} + \frac{n-1}{n} \int \sin^{n-2}(x) dx$$

$$\int \cos^n(x) = \frac{\cos^{n-1}(x) \sin(x)}{n} + \frac{n-1}{n} \int \cos^{n-2}(x) dx$$

$$\int \tan^n(x) = \frac{\tan^{n-1}(x)}{n-1} - \int \tan^{n-2}(x) dx$$

$$\int \csc^n(x) = -\frac{\csc^{n-2}(x) \cot(x)}{n} + \frac{n-2}{n-1} \int \csc^{n-2}(x) dx$$

$$\int \sec^n(x) = \frac{\sec^{n-2}(x) \tan(x)}{n} + \frac{n-2}{n-1} \int \sec^{n-2}(x) dx$$

$$\int \cot^n(x) = -\frac{\cot^{n-1}(x)}{n-1} - \int \cot^{n-2}(x) dx$$

$$\int \frac{1}{(au^2 + b)^n} du = \frac{2n-3}{2b(n-1)} \int \frac{1}{(au^2 + b)^{n-1}} du + \frac{u}{2b(n-1)(au^2 + b)^{n-1}}$$

$$\int \csc^n(x) \sec^n(x) dx = \frac{-\csc^{m-1}(x) \sec^{n-1}(x)}{m-1} + \frac{m+n-1}{m-1} \int \csc^{m-2}(x) \sec^n(x) dx$$

## 7.4. integrals of Hiperbolic functions

$$\int \sinh(x) dx = \cosh(x), \quad \int \cosh(x) dx = \sinh(x)$$

$$\int \tanh(x) dx = \ln |\cosh(x)|, \quad \int \coth(x) dx = \ln |\sinh(x)|$$

$$\int \operatorname{sech}(x) dx = \tan^{-1}(\sinh(x)), \quad \int \operatorname{csch}(x) dx = \ln |\tanh(x)|$$

$$\int \coth(x) dx = \ln |\sinh(x)|$$

## 7.5. Particular Integrals

$$\int e^{\alpha x} \sin(\beta x) dx = [e^{\alpha x} (\alpha \sin(\beta x) - \beta \cos(\beta x))] \frac{1}{\alpha^2 + \beta^2}$$

$$\int e^{\alpha x} \cos(\beta x) dx = [e^{\alpha x} (\alpha \cos(\beta x) + \beta \sin(\beta x))] \frac{1}{\alpha^2 + \beta^2}$$

## 7.6. Taylor series

$$T(x) = \sum_{n=0}^{\infty} \frac{f^n(a)}{n!} (x - a)^n$$

## 7.7. Riemann z function

$$f(s) = 1 + \frac{1}{2^s} + \frac{1}{3^s} + \frac{1}{4^s} + \dots$$

## 7.8. Gamma Function

$$\int_0^{\infty} e^{-t} t^{t-1} dt = \Gamma(t)$$

$$\gamma = \lim_{n \rightarrow \infty} \left[ \sum_{k=1}^n \frac{1}{k} - \ln(n) \right]$$

# 8. Vector Calculus

## 8.1. basic formulas

$$proj_u(v) = \left( \frac{u \cdot v}{u \cdot u} \right) u$$

## 8.2. 3d Line equation

$$\vec{r} = \vec{p} + t\vec{v}$$



## 9. Differential Equations

### 9.1. linearity

$$a_n(x)\frac{d^ny}{dx^n} + \dots + a_1(x)\frac{dy}{dx} + a_0(x)y = f(x)$$

## 9.2. homogeneous equations

given:

$$M(x, y)dx + N(x, y)dy = 0$$

the equation is homogeneous if M and N are homogeneous functions of the same exponent cambio de variable  $y = ux$  o  $x = uy$  ,  $dy = xdu + udx$  [Subsección 9.3](#)

## 9.3. homogeneous function of grade n

$$f(tx, ty) = t^n f(x, y)$$

## 9.4. Exact ED

para ser exacta tiene que cumplir dos condiciones

1.  $M(x, y)dx + N(x, y)dy = 0$
2.  $\frac{\partial M}{\partial y} = \frac{\partial N}{\partial x}$

si no las cumple puedes usar el factor integrante para que cumpla [Subsección 9.8](#)

para resolver toma en cuenta las siguientes dos cosas

$$f(x, y) = \int Mdx + g(y) = \int Ndy + h(x)$$

$$\frac{\partial F}{\partial x} = M , \quad \frac{\partial F}{\partial y} = N$$

## 9.5. Bernouully ecuation

aplica cuando la ecuacion diferencial tiene la siguiente forma:

$$P_0(x)\frac{dy}{dx} + P(x)y = F(x)y^n$$

se hace el cambio de variable  $u = y^{1-n}$  y se obtiene una ecuacion lineal

## 9.6. Ricat Ecuation

tiene la siguiente forma

$$y' = Q(x)y^2 + P(x)y + R(x)$$

se hace la sustitucion  $y = y_1 + u^{-1}$

## 9.7. Cauchy Euler ecuation

se usa para resolver una ecuacion de segundo grado

$$ax^2y'' + bxy' + cy = 0$$

$$y = x^r, \quad x > 0$$

## 9.8. integrant factor

aplica cuando hay una  $f(x, y)$  tal que  $f(x, y)(ED) = exacta$

- si  $\frac{M_y - N_x}{N}$  es funcion solamente de  $x$  entonces  $P(x) = \frac{M_y - N_x}{N}$

$f(x) = e^{\int P(x)dx}$  es un factor de integracion

- si  $M_y - N_x = m\frac{N}{x} - n\frac{M}{y}$  entonces

$f(x) = x^m y^n$  es un factor de integracion

used by [Elemento 9.4](#)

## 9.9. Linear differential equations

$$\frac{dy}{dx} + P(x)y = q(x)$$

$$u(x) = e^{\int P(x)dx}$$

$$\text{Sol} = u(x)y = \int u(x)q(x)dx$$

## 9.10. Order Reduction

aplica cuando conoces una solucion de una ED Lineal homogenea de segundo orden

$$y_2 = y_1 \int \frac{e^{-\int P(x)dx}}{y_1'} dx$$

$$y'' + P(x)y' + q(x)y = 0$$

## 9.11. Constant coefficients Ecuacion

para poder resolver por este metodo tiene que ser una ecuacion lineal de coeficientes constantes de la forma

$$y''C_1 + y'C_2 + yC_3 = 0$$

se hace la sustitucion

$$y = e^{rx}$$

quedara una funcion cuadratica en terminos de r

se puede llegar a usar la identidad de euler

la solucion queda de la forma:

$$y = C_1e^{r_1x} + C_2e^{r_2x}$$

tambien puede servir:

$$r = a + bi$$

$$y_1 = C_1 * e^{\alpha x} \cos(bx)$$

$$y_2 = C_2 * e^{\alpha x} \sen(bx)$$

nota: si hay multiplicidad, ejemplo:  $(r - 1)^3 = 0$

$$y_h = e^{rx} + xe^{rx} + x^2e^{rx}$$

siendo que  $r = 1$  entonces:

$$y_h = e^x + xe^x + x^2e^x$$

## 9.12. parameter variation

tienen la forma  $k_1 y'' + k_2 y' + k_3 y = f(x)$

$$u_1 = - \int \frac{y_2 f(x)}{W} dx \quad u_2 = \int \frac{y_1 f(x)}{W} dx$$

$$W = \begin{vmatrix} y_1 & y_2 \\ y_1' & y_2' \end{vmatrix}$$

siendo  $y_h$  la solución de la ecuación homogénea asociada

$$y_h = C_1 y_1 + C_2 y_2$$

y siendo  $y_p$  la solución definitiva

$$y_p = u_1 y_1 + C_2 y_2$$

## 9.13. Indeterminate Coeficients

$r(x)$  = polinomio, exponencial, Seno, Coseno

pasos:

1. Calcular  $y_n$  es decir calcular la ecuacion homogenea relacionada, por coeficientes constantes
2. Encontrar  $y_p$

caso 1 No hay funciones en comun con  $r(x)$

nota: tomar en cuenta el teorema de superposicion de soluciones si

$$r(x) = x^3 + x + 10 \operatorname{sen} 8x$$

simplemente se suman las proposiciones

$$y_p = Ax^3 + Bx^2 + Cx + D + A \operatorname{sen}(8x) + B \cos(8x)$$

y lo mismo aplica para la multiplicacion

$$\begin{aligned} & - y'' + C_1 y' + c_2 y = x^3 + x \\ & \text{proponer} \rightarrow y_p = Ax^3 + Bx^2 + Cx + D \\ & - y'' + C_1 y' + c_2 y = 10 \operatorname{sen} 8x \\ & \text{proponer} \rightarrow y_p = A \operatorname{sen}(8x) + B \cos(8x) \\ & - y'' + C_1 y' + c_2 y = 12e^{5x} \\ & \text{proponer} \rightarrow y_p = Ae^{5x} \end{aligned}$$

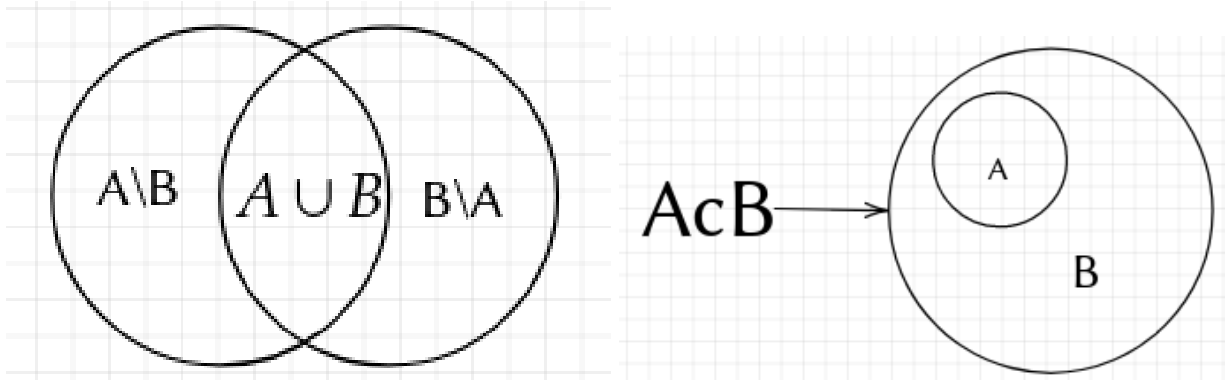
caso 2 hay funciones que coinciden con  $r(x)$

simplemente multiplicar la funcion por  $x$  hasta que no haya funciones en comun con  $x$  pero tiene que ser la  $x^n$  mas pequena posible

## 10. probability and statistics

$$P(\epsilon^c) = 1 - P(\epsilon)$$

$$P(A \cap B^c) = P(A \setminus B) = P(A) - P(A \cap B)$$



$$P(A \cup B) = P(A) + P(B) - P(A \cap B)$$

$$A \cap (B \cup A) = (A \cap B) \cup (A \cap A)$$

$$A \cup (B \cap A) = (A \cup B) \cap (A \cup A)$$

### 10.1. Independent Events

$$P(A|B) = \frac{P(A \cap B)}{P(B)}$$

$$p(A|B) = P(A \cup B) = p(A) * P(B)$$

### 10.2. morgan laws

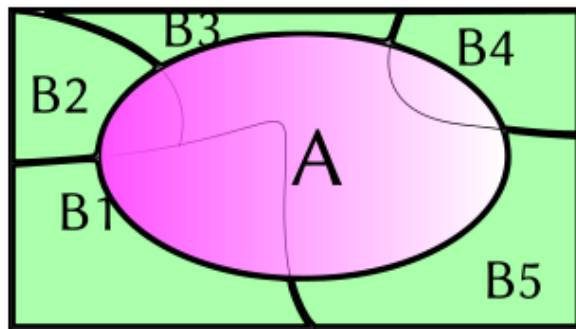
$$A^c \cup B^c = (A \cap B)^c$$



$$A^c \cap B^c = (A \cup B)^c$$

| = *dadoque*

### 10.3. separated probabilities



Sean  $B_k$  Eventos mutuamente excluyentes, pariticion de  $S$

$$P(A) = P(B_1)P(A|B_1) + P(B_2)P(A|B_2) + \dots + P(B_k)P(A|B_k!)$$

$$P(A) = \sum_{i=1}^k P(B_i)P(A|B_k)$$

$$P(B_i|A) = \frac{P(B_i) * P(A|B_i)}{P(A)}$$

$$P(B_i|A) = \frac{P(B_i) - P(A|B_i)}{\sum_{i=1}^k P(B_i)P(A|B_k)}$$

$$a^{\Phi(m)} = 1(mod\ m)$$

$$\Phi(p \times q) = (p - 1)(q - 1) \text{ para } pq \text{ primos}$$

$$\Phi(p_1^{k_1} \times \dots \times p_n^{k_n}) = (p_1^{k_1} - p_1^{k_1-1}) \times \dots \times (p_n^{k_n} - p_n^{k_n-1})$$

## 11. Numerical Calculus

### 11.1. Taylor Polinomial

$$f(x) \approx f(x_0) + f'(x_0)(x - x_0) + \frac{f''(x - x_0)^2}{2!}$$

$$= \sum_{i=0}^n \frac{f^i(x_0)(x - x_0)^i}{i!}$$

### 11.2. Newton Raphson

$$P_{n+1} = P_n - \frac{f(P_0)}{f'(P_0)}$$

### 11.3. Complement to one

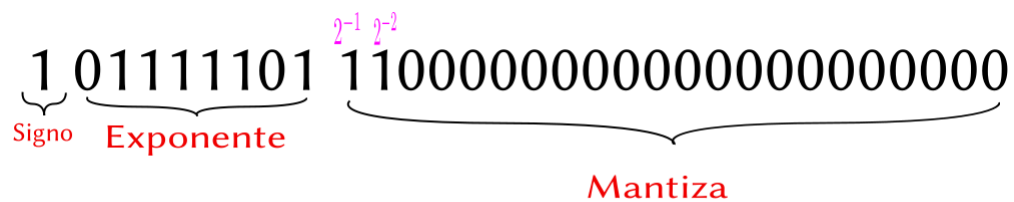
### 11.4. complement to two

se cambian 1 por ceros y viceversa

### 11.5. complemento a dos

de derecha a izquierda y apartir del primer 1 encontrado sin incluirlo se hace la operacion de complemento a uno

## 11.6. convertir de punto flotante a decimal



Ejemplo:

$$\begin{aligned}
 & (-1) \times (1 + \textit{mantisa}) \times 2^{\textit{expo} - \textit{maxExpo}} \\
 & (-1) \times (1 + 0,75) \times 2^{124 - 127} \\
 & = -0,21875
 \end{aligned}$$

## 11.7. convert decimal to float

Ejemplo:

$$171,25 = 10101011,01$$

Se pasa a una forma con exponente dejando solo un entero

$$1,010101101 \times 2^7$$

El primer bit es de signo

$$1 = -$$

$$0 = +$$

Los siguientes 8 numeros son el maximo exponente mas el exponente al que esta elevado el 2

$$127 + 7 = 134$$

se convierte el 134 a base 2

$$134_{10} = 10000110_2$$

y la parte decimal es la mantiza, que queda igual

$$010101101$$

## 11.8. Convert decimal fraction to float

para convertir de fraccionario a binario primero se convierte la parte entera y la parte fraccionaria se convierte usando el siguiente codigo

Codigo:

```
//se da un flotante de la forma 0.321312 con  
//el numero de digitos a convertir  
//ejemplo  
//in: 0.42344 3  
//out: .001  
string FraccionBinaria(float FraccionDecimal,int NumeroDeDigitos)  
{  
    string ans = ".";  
    for(int i=0;i<NumeroDeDigitos;i++)  
    {  
        FraccionDecimal*=2;  
        if(FraccionDecimal > 1.0)  
        {  
            FraccionDecimal-=1.0;  
            ans.push_back('1');  
        }  
        else  
        {  
            ans.push_back('0');  
        }  
    }  
    return ans;  
}
```

## 11.9. Fixed point iteration

de una ecuacion se despeja  $x$  y se substituye, tomando el resultado anterior empezando desde una  $x$  arbitraria

## 11.10. Divided differences

$$f[x_0, x_1] = \frac{f(x_1) - f(x_0)}{x_1 - x_0}$$

$$f[x_0, x_1, x_2] = \frac{f(x_1, x_2) - f(x_0, x_1)}{x_2 - x_0}$$

$$f[x_0, x_1, x_2, x_3] = \frac{f(x_2, x_3) - f(x_0, x_1)}{x_3 - x_0}$$

$$P_n = a_0 + a_1(x - x_0) + a_2(x - x_0)(x - x_1) + \dots + a_n(x - x_0) \times \dots \times (x - x_n)$$

$j$	$X_j$	$f(X_j)$	1	2
0	$X_0$	$f(X_0)$	1	1
1	$X_1$	$f(X_1)$	$f(X_0, X_1)$	1
2	$X_2$	$f(X_2)$	$f(X_1, X_2)$	$f(X_0, X_1, X_2)$

## 11.11. Lagrange Polinomial

$$P_n(x) = \sum_{i=0}^n L_i(x) f(x_i)$$

$$L_i(x) = \prod_{\substack{j=0 \\ j \neq i}}^n \frac{(x - x_j)}{(x_i - x_j)}$$



## 12. Arch Linux

### 12.1. Maintenance

```
#check file size  
du -sh .cache/  
#remove a file  
rm -rt .cache/  
#delete what you don't need in .config file
```

specific maintenance:

```
#check the failed systems  
systemctl --failed  
#check the systemd journal  
sudo journalctl -p 3-xb  
#if the system doesn't boots then ctrl+alt+shift the  
#then update mirrors  
#clar chache  
  
#then to update the whole system use:  
sudo pacman -Syyu  
#to check system updates  
sudo pacman -Syu  
#if you wan't to remove all packages in the drive us  
sudo pacman -Scc  
#remove all unwanted dependencies  
paru -Yc  
#remove orphan packages  
sudo pacman -Rns \$(pacman -Qdtq)  
#sudo pacman -Syyy Synchronise data use "mirror1"
```

## 12.2. Print in arch linux

install packages: usbutils, lsusb, cups  
use this to make cups usable

```
sudo systemctl enable cups
sudo systemctl start cups
localhost:631
```

```
lp -d HP_Officejey_Pro_8600]
```

## 12.3. configure date and time

```
hwclock --set --date = "04/32/2021 19:00:00"
hwclock -hctosys
```

## 12.4. Configure wireless

*#when entering an iso*

```
iwctl
```

*#then in the ui*

*#to list all available devices*

```
device list
```

*#to scan networks*

```
station <device> scan
```

*#to get newworks*

```
station <device> get-network
```

```
#to connect to a network  
station <device> connect "<name of network>"
```

```
#to check if the connection is stable  
ping -c 5 8.8.8.8
```

```
#don't forget before rebooting the iso run  
pacman nmtui
```

dwm basic configuration

```
#MODKEY + shift + q to restart X server  
startx # to start the X server
```

## 12.5. mount devices

mount usb sticks:

```
#to mount a usb stick  
mount /dev/sdb1 /mnt/<destination folder>  
#to unmount a usb stick  
umount /dev/sdb1
```

mount an android device:

```
#to mount an android device  
simple-mtpfs --device 1 tablet/  
  
#to unmount an android device  
fusermount -u /tablet
```

## 13. Latex

### 13.1. commonly used special symbols

use the shortcut created to don't waste time

$\backslash = \backslash \text{textbackslash}$

$| = \backslash \text{textbar}$

$- = \backslash -$

### 13.2. Greek and Hebrew Letters

$\alpha$	$\backslash$ alpha	$\kappa$	$\backslash$ kappa	$\psi$	$\backslash$ psi
$\beta$	$\backslash$ beta	$\lambda$	$\backslash$ lambda	$\rho$	$\backslash$ rho
$\chi$	$\backslash$ chi	$\mu$	$\backslash$ mu	$\tau$	$\backslash$ tau
$\epsilon$	$\backslash$ epsilon	$\phi$	$\backslash$ o	$\theta$	$\backslash$ theta
$\eta$	$\backslash$ eta	$\omega$	$\backslash$ omega	$\upsilon$	$\backslash$ upsilon
$\gamma$	$\backslash$ gamma	$\phi$	$\backslash$ phi	$\xi$	$\backslash$ xi
$\iota$	$\backslash$ iota	$\pi$	$\backslash$ pi	$\zeta$	$\backslash$ zeta
$F$	$\backslash$ digamma	$\Delta$	$\backslash$ Delta	$\Theta$	$\backslash$ Theta
$\varepsilon$	$\backslash$ varepsilon	$\Gamma$	$\backslash$ Gamma	$\Upsilon$	$\backslash$ Upsilon
$\varkappa$	$\backslash$ varkappa	$\Lambda$	$\backslash$ Lambda	$\Xi$	$\backslash$ Xi
$\varphi$	$\backslash$ varphi	$\Omega$	$\backslash$ Omega		
$\varpi$	$\backslash$ varpi	$\Phi$	$\backslash$ Phi	$\aleph$	$\backslash$ aleph
$\varrho$	$\backslash$ varrho	$\Pi$	$\backslash$ Pi	$\beth$	$\backslash$ beth
$\varsigma$	$\backslash$ varsigma	$\Psi$	$\backslash$ Psi	$\daleth$	$\backslash$ daleth
$\vartheta$	$\backslash$ vartheta	$\Sigma$	$\backslash$ Sigma	$\gimel$	$\backslash$ gimel

### 13.3. math constructs

$\frac{abc}{xyz}$	<code>\frac{abc}{xyz}</code>	$\overline{abc}$	<code>\overline{abc}</code>	$\overrightarrow{abc}$	<code>\overrightarrow{abc}</code>
$f'$	<code>\f'</code>	$\underline{abc}$	<code>\underline{abc}</code>	$\overleftarrow{abc}$	<code>\overleftarrow{abc}</code>
$\sqrt{abc}$	<code>\sqrt{abc}</code>	$\widehat{abc}$	<code>\widehat{abc}</code>	$\overbrace{abc}$	<code>\overbrace{abc}</code>
$\sqrt[n]{abc}$	<code>\sqrt[n]{abc}</code>	$\widetilde{abc}$	<code>\widetilde{abc}</code>	$\underbrace{abc}$	<code>\underbrace{abc}</code>

### 13.4. Delimiters

	—	{	\{	⌊	\lfloor	/	/
	\vert	{	\}	⌋	\rfloor	\	\backslash
	\	<	\langle	⌈	\lceil	[	[
	\Vert	>	\rangle	⌋	\rceil	]	]

use the pair `/lefts` and `/rights`

example:

`\left| expr \right|`

## 13.5. Variable Sized simbols

$\sum$	<code>\sum</code>	$\int$	<code>\int</code>	$\biguplus$	<code>\biguplus</code>
$\prod$	<code>\prod</code>	$\oint$	<code>\oint</code>	$\bigcap$	<code>\bigcap</code>
$\coprod$	<code>\coprod</code>	$\iint$	<code>\iint</code>	$\bigcup$	<code>\bigcup</code>
$\bigoplus$	<code>\bigoplus</code>	$\bigvee$	<code>\bigvee</code>	$\bigotimes$	<code>\bigotimes</code>
$\bigwedge$	<code>\bigwedge</code>	$\bigodot$	<code>\bigodot</code>	$\bigsqcup$	<code>\bigsqcup</code>

## 13.6. binary operation relation symbols

$\cap$	<code>\cap</code>	$\cup$	<code>\cup</code>
$\uplus$	<code>\uplus</code>	$\sqcup$	<code>\sqcup</code>
$\sqcap$	<code>\sqcap</code>	$\wedge$	<code>\wedge</code>
$\vee$	<code>\vee</code>	$\equiv$	<code>\equiv</code>
$\neq$	<code>\neq</code>	$\simeq$	<code>\simeq</code>
$\approx$	<code>\approx</code>	$\doteq$	<code>\doteq</code>
$\subset$	<code>\subset</code>	$\because$	<code>\because</code>
$\sqsubset$	<code>\sqsubset</code>	$\sqsubseteq$	<code>\sqsubseteq</code>
$\geq$	<code>\geq</code>	$\therefore$	<code>\therefore</code>

## 13.7. arrow symbols

$\leftarrow$	<code>\leftarrow</code>	$\Leftarrow$	<code>\Leftarrow</code>
$\rightarrow$	<code>\rightarrow</code>	$\Rightarrow$	<code>\Rightarrow</code>
$\leftrightarrow$	<code>\leftrightarrow</code>	$\Leftrightarrow$	<code>\Leftrightarrow</code>
$\uparrow$	<code>\uparrow</code>	$\Uparrow$	<code>\Uparrow</code>
$\downarrow$	<code>\downarrow</code>	$\Downarrow$	<code>\Downarrow</code>
$\updownarrow$	<code>\updownarrow</code>	$\Updownarrow$	<code>\Updownarrow</code>
$\nearrow$	<code>\nearrow</code>	$\searrow$	<code>\searrow</code>
$\swarrow$	<code>\swarrow</code>	$\nwarrow$	<code>\nwarrow</code>

## 13.8. miscelanious

$\infty$	<code>\infty</code>	$\partial$	<code>\partial</code>
$\cdots$	<code>\cdots</code>	$\vdots$	<code>\vdots</code>
$\vdots$	<code>\vdots</code>	$\ldots$	<code>\ldots</code>
$\ddots$	<code>\ddots</code>	$\forall$	<code>\forall</code>
$\exists$	<code>\exists</code>	$\nexists$	<code>\nexists</code>
$\emptyset$	<code>\emptyset</code>	$\angle$	<code>\angle</code>
$\angle$	<code>\angle</code>	$\measuredangle$	<code>\measuredangle</code>
$\cap$	<code>\cap</code>	$\cap$	<code>\cap</code>
$\cap$	<code>\cap</code>	$\cap$	<code>\cap</code>

## 13.9. Matrices

matrices		
type	latex markup	Renders as
Plain	$\begin{matrix} \begin{matrix} 1 & 2 \end{matrix} \\ \begin{matrix} 2 & 3 \end{matrix} \end{matrix}$	$\begin{pmatrix} 1 & 2 \\ 3 & 4 \end{pmatrix}$

`< opt >`:

in this part you can specify which kind of matrix you want so you can place p: parenthesis matrix ( )

b:bracket matrix [ ]

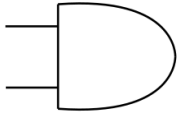
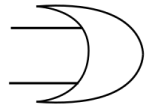
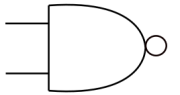

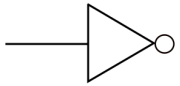
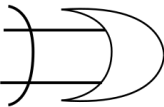
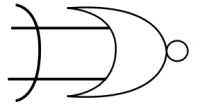
B: for braces matrix { }

v: for pipes matrix | |

V: for double pipe ||

## 14. Electronics

### 14.1. Logic Gates

	And	$A*B$
	Or	$A+B$
	Nand	$A'*B'$
	Nor	$A'+B'$
	Not	$A'$
	XOr	$(A'*B) + (A*B')$
	XNor	$[(A'*B) + (A*B')]'$



## 14.2. MinTerminos y max terminos

a	b	c	term
0	0	0	$m_0 = x'y'z'$
0	0	1	$m_1 = x'y'z$
0	1	0	$m_2 = x'yz'$
0	1	1	$m_3 = x'yz$
1	0	0	$m_4 = xy'z'$
1	0	1	$m_5 = xy'z$
1	1	0	$m_6 = xyz'$
1	1	1	$m_7 = xyz$

## 15. Physics

### 15.1. Motion with constant acceleration

$$v = v_0 + at$$

$$x = x_0 + v_0t + \frac{at^2}{2}$$

$$v^2 = v_0^2 + 2a(x - x_0)$$