Formulario general

Virgilio Murillo Ochoa
5 de mayo de 2021

Índice

1. Algebra **6**
- 1.1. factorization . . . 6
- 1.2. Sintetic divition . . . 7
- 1.3. cubic differences . . . 8
- 1.4. general formula . . . 8
- 1.5. Logarithms . . . 8

2. Boolean Algebra **9**
- 2.1. Simple Formulas . . . 9

3. Complex Algebra **9**
- 3.1. Polar coordinates . . . 9
- 3.2. Basic identiies and formulas . . . 10
- 3.3. Euler identity . . . 10
- 3.4. Multiplicative cycles . . . 11
- 3.5. Graphs . . . 11
- 3.6. Triangle inequality . . . 12
- 3.7. Golden Triangle . . . 12

4. Linear Algebra **12**
- 4.1. dot and cross product . . . 12
- 4.2. Crammer Rule . . . 13
- 4.3. Gauss jordan Algorithm . . . 13
- 4.4. simetry on matrices . . . 13

5. Trigonometry **14**
- 5.1. Basic Identities . . . 14
- 5.2. Double Angle . . . 14
- 5.3. Sin in terms of e . . . 14
- 5.4. hyperbolic functions . . . 15
- 5.5. square reduction . . . 15
- 5.6. Polar Coordinates . . . 15

6. Diferential Calculus **18**
- 6.1. basic formulas . . . 18
- 6.2. Limits . . . 18
- 6.3. Derivatives of inverse trigonometric functions . . . 18

6.4. Derivatives of Hiperbolic functions 19

7. Integral Calculus **20**
7.1. basic integral formulas 20
7.2. Weirestrass substitution 20
7.3. Reduction formulas 21
7.4. integrals of Hiperbolic functions 22
7.5. Particular Integrals 22
7.6. Taylor series 23
7.7. Riemann z function 23
7.8. Gamma Function 23

8. Vector Calculus **23**
8.1. basic formulas 23
8.2. 3d Line equation 24

9. Differential Ecuations **25**
9.1. linearity 25
9.2. homogeneous ecuations 26
9.3. homogeneous function of grade n 26
9.4. Exact ED 26
9.5. Bernouully ecuation 27
9.6. Ricat Ecuation 27
9.7. Cauchy Euler ecuation 27
9.8. integrant factor 27
9.9. Linear differential equations 28
9.10. Order Reduction 28
9.11. Constant coeficients Ecuation 29
9.12. parameter variation 30
9.13. Indeterminate Coeficients 31

10. probability and statistics **32**
10.1. Independent Events 32
10.2. morgan laws 32
10.3. separated probabilities 34

11. Numerical Calculus **35**
11.1. Taylor Polinomial 35
11.2. Newton Raphson 35

11.3. Complement to one . . . 35
11.4. complement to two . . . 35
11.5. complemento a dos . . . 35
11.6. convertir de punto flotante a decimal . . . 36
11.7. convert decimal to float . . . 37
11.8. Convert decimal fraction to float . . . 38
11.9. Fixed point iteration . . . 39
11.10Divided differences . . . 40
11.11Lagrange Polinomial . . . 40

12. Arch Linux **41**
12.1. Mantainance . . . 41
12.2. Print in arch linux . . . 42
12.3. configure date and time . . . 42
12.4. Configure wireless . . . 42
12.5. mount devices . . . 43

13. Latex **44**
13.1. commonly used special symbols . . . 44
13.2. Greek and Hebrew Letters . . . 44
13.3. math constructs . . . 45
13.4. Delimeters . . . 45
13.5. Variable Sized simbols . . . 46
13.6. binary operation relation symbols . . . 46
13.7. arrow symbols . . . 46
13.8. miscelanious . . . 47
13.9. Matrices . . . 47

14. Electronics **48**
14.1. Logic Gates . . . 48
14.2. MinTerminos y max terminos . . . 49

15. Physics **50**
15.1. Motion with constant acceleration . . . 50

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 posibilities are in the space p/q that are integers so:

x^3	x^2	x	TI	
1	-5	2	8	
	-1	6	-8	$x = -1$
1	-6	8	0	

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

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

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

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

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

$$AB + AB' = A$$

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

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

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

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

3. Complex Algebra

3.1. Polar coordinates

$$(r, \theta)$$

3.2. Basic identiies and formulas

Basic convertions:

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

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

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

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

Basic Formulas:

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

$$Z = a + bi$$
$$\overline{Z} = a - bi$$
$$\overline{Z} + \overline{w} = \overline{Z + w}$$
$$\overline{Z} \times Z = |Z|^2$$

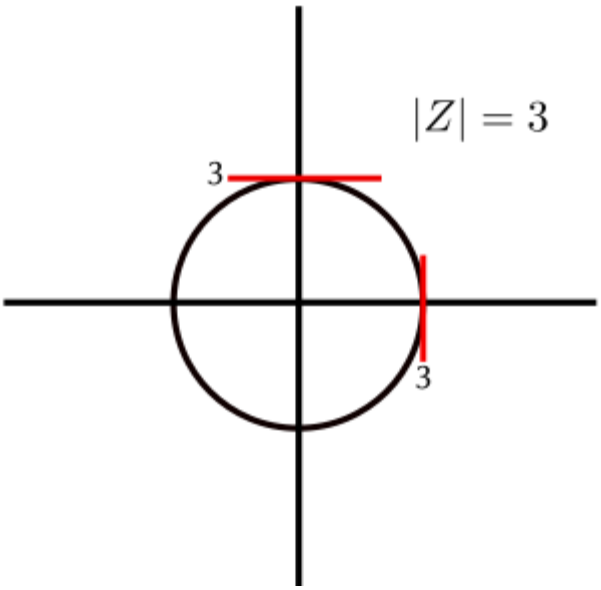
3.3. Euler identity

$$e^{iz} = \cos(z) + i\,\mathrm{sen}(z)$$
$$e^{\pi i} + 1 = 0$$

3.4. Multiplicative cycles

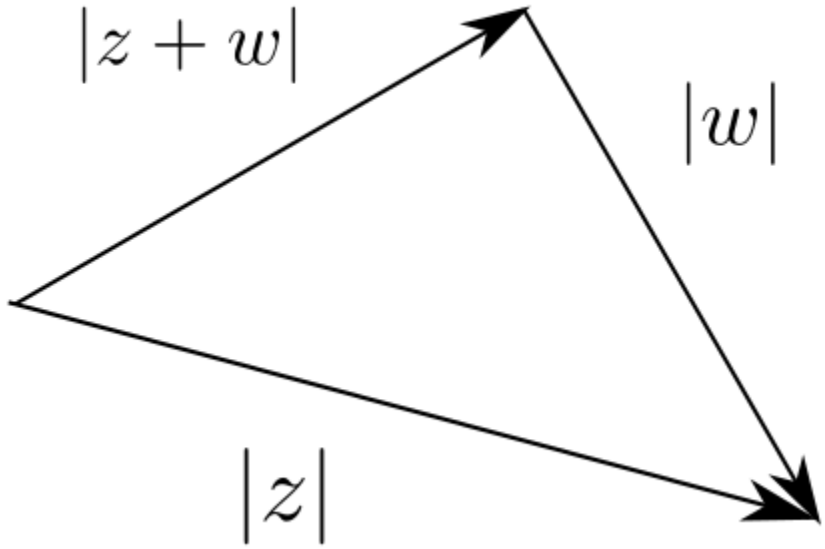
$$i = i$$
$$i^2 = -1$$
$$i^3 = -i$$
$$i^4 = 1$$
$$i^5 = i$$

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

$$|\vec{a} \times \vec{b}| = |\vec{a}||\vec{b}| \sin\theta$$
$$\vec{a}.\vec{b} = |\vec{a}||\vec{b}| \cos\theta$$
$$A^{-1} = frac(adjA)^T def(A)$$

4.2. Crammer Rule

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

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

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

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

$$\cosh^2(x) - \operatorname{senh}^2(x) = 1$$
$$\operatorname{sech}^2(x) + \tan^2(x) = 1$$
$$\operatorname{senh}(x \pm y) = \sinh(x)\cosh(y) \pm \cosh(x)\sinh(x)$$
$$\cosh(x \pm y) = \cosh(x)\cosh(y) \pm \sinh(x)\sinh(y)$$

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 symetry around the x axis:

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

The symetry 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

$$(\tan(x))' = \sec^2(x),\ (\csc(x))' = \csc(x)cot(x)$$
$$(\sec(x))' = \sec(x)\tan(x),\ (\cot(x))' = -\csc^2(x)$$
$$(\ln(x))' = \frac{1}{x}$$
$$(a^x)' = a^x ln(a) * x'$$
$$(\frac{f(x)}{g(x)})' = \frac{g(x)f(x)' = g(x)'f(x)}{(g(x))^2}$$

6.2. Limits

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

6.3. Derivatives of inverse trigonometric functions

$$(\sin^{-1}(x))' = \frac{x'}{\sqrt{1-x^2}},\ (\cos^{-1}(x))' = \frac{-x'}{\sqrt{1-x^2}}$$
$$(\tan^{-1}(x))' = \frac{x'}{x^2+1},\ (\cot^{-1}(x))' = \frac{-x'}{x^2+1}$$
$$(\sec^{-1}(x))' = \frac{x'}{|x|\sqrt{x^2+1}},\ (\csc^{-1}(x))' = \frac{-x'}{|x|\sqrt{x^2+1}}$$

6.4. Derivatives of Hiperbolic functions

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

7. Integral Calculus

7.1. basic integral formulas

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

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

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

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

$$\int \tan(x) dx = \ln|\sec(x)| \quad or \quad -\ln|\cos(x)|$$

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

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

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

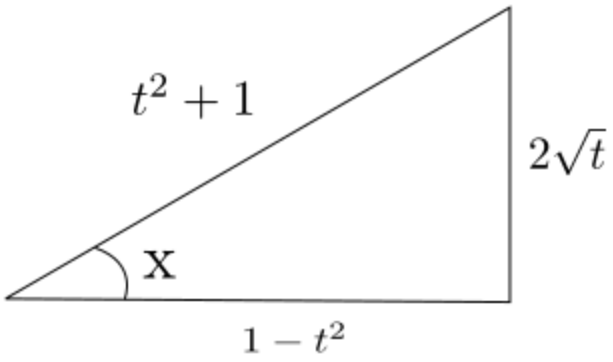
7.2. Weierstrass substitution

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

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

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

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

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

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

$$f(s) = 1 + \frac{1}{2^5} + \frac{1}{3^5} + \frac{1}{4^5} + ...$$

7.8. Gamma Function

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

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

8. Vector Calculus

8.1. basic formulas

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

8.2. 3d Line equation

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

9. Differential Ecuations

9.1. linearity

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

9.2. homogeneous ecuations

given:

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

the ecuation 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

$$f(x,y) = \int M dx + g(y) = \int N dy + h(x)$$

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

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

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

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

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 $P(x) = \frac{M_y - N_x}{N}$

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

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

$$f(x) = x^m y^n \text{ es un factor de integracion}$$

used by Elemento 9.4

9.9. Linear differential equations

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

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

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 coeficients Ecuation

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:

$$r = a + bi$$

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

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

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 $k_1y^{''} + k_2y^{'} + k_3y = f(x)$

$$u_1 = -\int \frac{y_2f(x)}{W}dx \qquad u_2 = \int \frac{y_1f(x)}{W}dx$$

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

siendoy_h la solucion de la ecuacion homogenea asociada

$$y_h = C_1 y_1 + C_2 y_2$$

y siendo y_p la solucion definitiva

$$y_p = u_1 y_1 + C_2 y_2$$

9.13. Indeterminate Coeficients

$$r(x) = \text{polinomio, exponencial, Seno, Coseno}$$

pasos:

1. Calcular y_n es decir calcular la ecuacion homogenea relacionada, por coeficientes constantes

2. Encontrat y_p

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

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

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

simplemente se suman los proposiciones

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

y lo mismo aplica para la multiplicacion

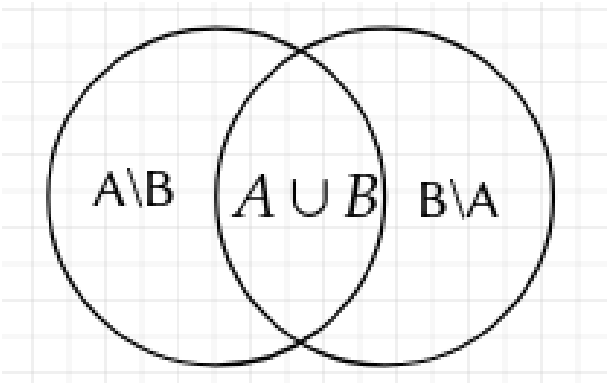
- $y'' + C_1y' + c_2y = x^3 + x$
  proponer $\rightarrow y_p = Ax^3 + Bx^2 + Cx + D$
- $y'' + C_1y' + c_2y = 10\,\text{sen}\,8x$
  proponer $\rightarrow y_p = A\,\text{sen}(8x) + B\cos(8x)$
- $y'' + C_1y' + c_2y = 12e^{5x}$
  proponer $\rightarrow y_p = Ae^{5x}$

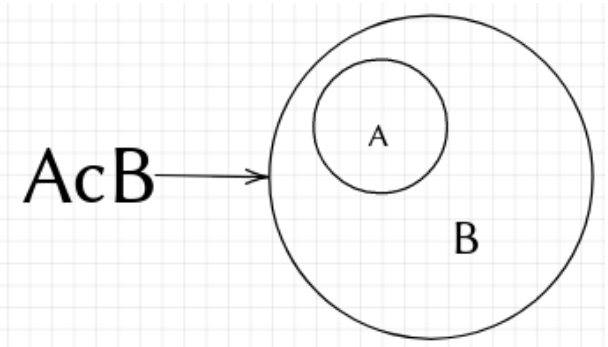
caso 2 hay funciones que coinciden con r(x)

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

10. probability and statistics

$$P(\epsilon^c) = 1 - P(\epsilon)$$
$$P(A \cap B^c) = P(A \backslash B) = P(A) - P(A \cup B)$$





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

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

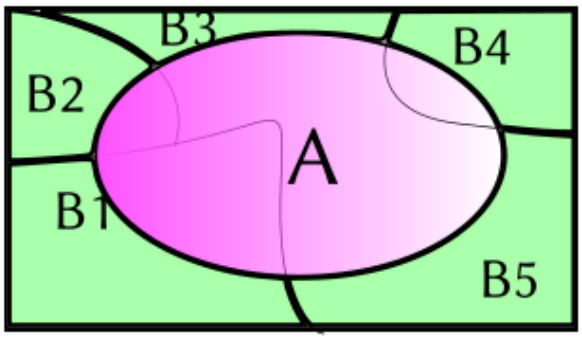
10.1. Independent Events

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

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, paritición de S

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

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

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

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

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

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

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

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

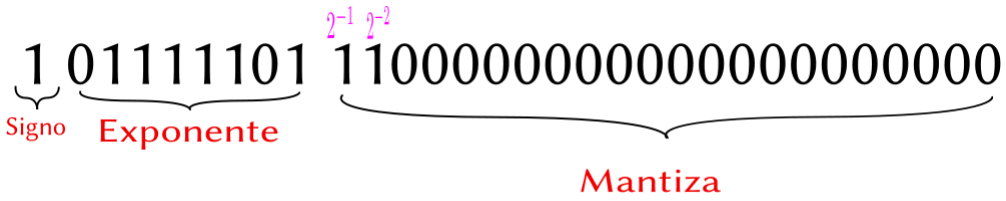
11.4. complement to two

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:

$$(-1) \times (1 + mantisa) \times 2^{expo - maxExpo}$$

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

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

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

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

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

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

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. Mantainance

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

specific mantainance:

```
#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 then timeshift
#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 use
sudo pacman -Scc
#remove all unwanted dependencies
paru -Yc
#remove orphan packages
sudo pacman -Rns \$(pacman - Qdtq)
#sudo pacman -Syyy Syncrhonise data use "mirror1"
```

12.2. Print in arch linux

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

```
sudo systemct 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 staable
ping -c s 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 sub stick
umount /dev/sdb1
```

mount an android device:

```
#to mount and 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
\= \textbackslash
|= \textbar
_ = _

13.2. Greek and Hebrew Letters

α	\ alpha	κ	\ kappa	ψ	\ psi
β	\ beta	λ	\ lambda	ρ	\ rho
χ	\ chi	μ	\ mu	τ	\ tau
ϵ	\ epsilon	$\o$	\ o	θ	\ theta
η	\ eta	ω	\ omega	υ	\ upsilon
γ	\ gamma	ϕ	\ phi	ξ	\ xi
ι	\ iota	π	\ pi	ζ	\ zeta
$\digamma$	\ digamma	Δ	\ Delta	Θ	\ Theta
ε	\ varepsilon	Γ	\ Gamma	Υ	\ Upsilon
$\varkappa$	\ varkappa	Λ	\ Lambda	Ξ	\ Xi
φ	\ varphi	Ω	\ Omega		
ϖ	\ varpi	Φ	\ Phi	$\aleph$	\ aleph
ϱ	\ varrho	Π	\ Pi	$\beth$	\ beth
ς	\ varsigma	Ψ	\ Psi	$\daleth$	\ daleth
ϑ	\ vartheta	Σ	\ Sigma	$\gimel$	\ gimel

13.3. math constructs

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

13.4. Delimeters

$\vert$	—	$\{$	\ {	$\lfloor$	\lfloor	/	/
$\vert$	\vert	$\{$	\}	$\rfloor$	\rfloor	\	\backslash
$\Vert$	\\|	$\langle$	\langle	$\lceil$	\lceil	[	[
$\Vert$	\Vert	$\rangle$	\rangle	$\rceil$	\rceil	]	]

use the pair /lefts and /rights
example:
\left| *expr* \right|

13.5. Variable Sized simbols

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

13.6. binary operation relation symbols

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

13.7. arrow symbols

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

13.8. miscelanious

∞	\infty	∂	\partial
$\cdots$	\cdots	$\vdots$	\vdots
$\vdots$	\vdots	$\ldots$	\ldots
$\ddots$	\ddots	$\forall$	\forall
$\exists$	\exists	$\nexists$	\nexists
$\emptyset$	\emptyset	$\angle$	\angle
$\angle$	\angle	$\measuredangle$	\measuredangle
$\cap$	\cap	$\cap$	\cap
$\cap$	\cap	$\cap$	\cap

13.9. Matrices

matrices		
type	latex markup	Renders as
Plain	*begin*{<opt> *matrix*} 1 2\\ 2 3 *end*{<opt> *matrix*}	1 2 3 4

< *opt* >:

in this part you can specify which kind of matrix you wan't so you can place p: parenthesis matrix ()

b:bracket matrix []

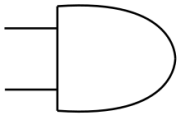
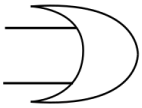
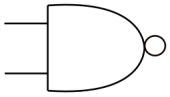
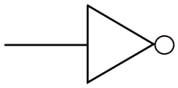
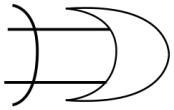
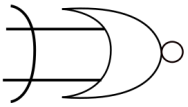
B: for braces matrix

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

$$v = v_0 + at$$
$$x = x_0 + v_0 t + \frac{at^2}{2}$$
$$v^2 = v_0^2 + 2a(x - x_0)$$