Tarea #2 Procesos numéricos

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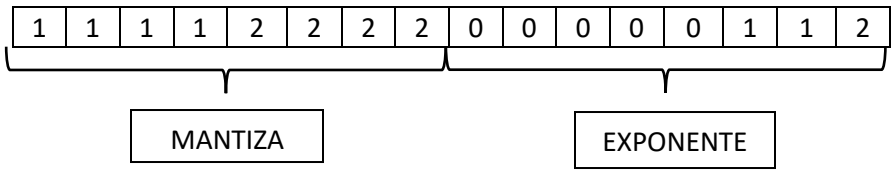
2. Cambie cada uno de los siguientes números a base 10.

- $235_6 \rightarrow 2*6^2 + 3*6^1 + 5*6^0 = 95_{10}$
- $65_9 \rightarrow 6*9^1 + 5*9^0 = 59_{10}$
- $11112222220000 \rightarrow 1*3^{13} + 1*3^{12} + 1*3^{11} + 1*3^{10} + 2*3^9 + 2*3^8 + 2*3^7 + 2*3^6 + 2*3^5 + 2*3^4 + 0*0^3 + 0*0^2 + 0*0^1 + 0*0^0 = 2420928_{10}$
- $555ABC_{13} \rightarrow 5*13^5 + 5*13^4 + 5*13^3 + A*13^2 + B*13^1 + C*13^0 = 2012100_{10}$
- $A1B2C3D4E5F6_{16} \rightarrow A*16^{11} + 1*16^{10} + B*16^9 + 2*16^8 + C*16^7 + 3*16^6 + D*16^5 + 4*16^4 + E*16^3 + 5*16^2 + F*16^1 + 6*16^0 = 177789162812934_{10}$

6. Considere una máquina de 16 bits que trabaja en base tres. Los bits los tienen distribuidos por partes iguales para mantisa y exponente (ignore los signos). ¿Cómo se almacena cada uno de los siguientes números?

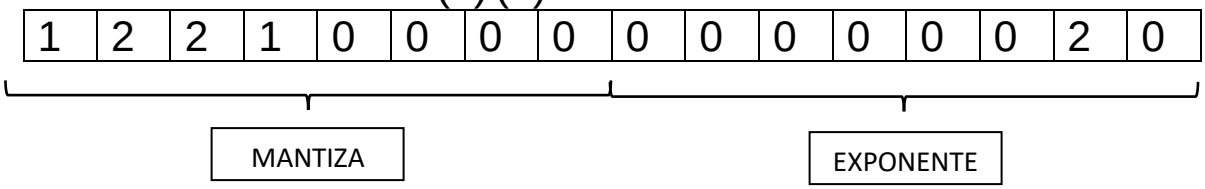
- 11112222220000_3



- $222222.111111113 \rightarrow 2730.333339691162_{10}$

- **468** $\rightarrow 122100_3 \rightarrow 0.122100 \times 3^{20}$

  468 | 3
  (0) 156 | 3
  (0) 52 | 3
  (1) 17 | 3
  (2) 5 | 3
  (2) (1)

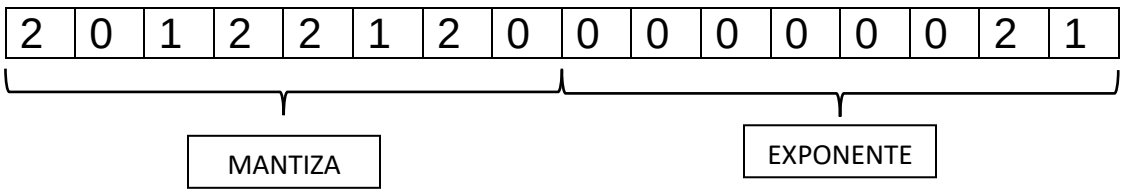


- **2354.217**

- **11000111000.0001111_2**

- **123A11**$\rightarrow 1616_{10} \rightarrow 2012212_3 \rightarrow 0.2012212 \times 3^{21}$

  1616 | 3
  (2) 538 | 3
  (1) 179 | 3
  (2) 59 | 3
  (2) 19 | 3
  (1) 6 | 3
  (0) (2)



- 22354.217 → 1260.276 → 1201200.02 → 0.12012000×3^{21}

1260 | 3 — 0.216 x 3 = 0.828

(0) 420 | 3 — 0.828 x 3 =2.484

(0) 140 | 3

(2) 46 | 3

(1) 15 | 3

(0) 5 | 3

(2) (1)

0.12012000×3^{21}

1	2	0	1	2	0	0	0	0	0	0	0	0	2	1

- $11000111000.0001111_2 \rightarrow 1592.1171875_{10} \rightarrow 2011222.01_3 \rightarrow 0.20112220 \times 3^{22}$

1593 | 3 — 0.1171875 x 3 =0.3515625

(2) 530 | 3 — 0.3515625 x 3 =1.0546875

(2) 176 | 3

(2) 58 | 3

(1) 19 | 3

(1) 6 | 3

(0) (2)

0.20112220×3^{22}

2	0	1	1	2	2	2	0	0	0	0	0	0	0	2	1

- $222222.111111113_4 \rightarrow 2730.333339691162_{10} \rightarrow 10202010_3 \rightarrow 0.10202010 \times 3^{22}$

2730 | 3

(0) 910 | 3

(1) 303 | 3

(0) 101 | 3

(2) 33 | 3

(0) 11 | 3

(2) 3 | 3

(0) (1)

0.10202010×3^{22}

1	0	2	0	2	0	1	0	0	0	0	0	0	0	2	2

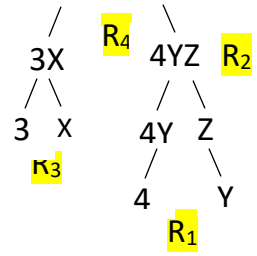
13. Con base en los datos del ejercicio 11 hallar el máximo error absoluto

Datos: $X = 23{,}35 \pm 0.43 * 10^{-4}$ $Y = 75{,}35 \pm 0{,}23 * 10\text{^} - 5$

$Z = 31.1356 \pm 0{,}78 * 10\text{^} - 5$

EJERCICIO #1

V= 3X – 4YZ



$E_{4Y} = YE_4 + 4E_Y + r1$

$E_{4Y.Z} = ZE_{4Y} + 4YE_Z + R_2$

$= Z\,(YE_4 + 4E_Y + R_1) + 4YE_Z + r_2$

$=ZYE_4 + 4ZE_Y + ZR_1 + 4YE_Z + R_2$

$E_{3X} = XE_3 + 3E_X + R_3$

$Ev = E_{3X} - E_{4YZ}$

$Ev = XE_3 + 3E_X + R_3 - ZYE_4 - 4ZE_Y - ZR_1 - 4YE_Z + R_2$

$Ev = XE_3 + 3E_X - ZYE_4 - 4ZE_Y - 4YE_Z + R_2 + R_3 + ZR_1$

$R1 \leq 0.5 \times 10^{-5}$

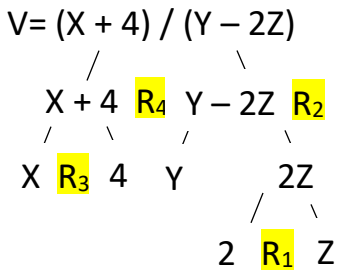
$R2 \leq 0.5 \times 10^{-5}$

$R3 \leq 0.5 \times 10^{-4}$

$Ev \leq 0.250837 \times 10^{-2} + (R_2 + R_3 + ZR_1)$

$Ev \leq 0.401015 \times 10^{-2}$

EJERCICIO #2



$E_{2Z} = ZE_2 + 2E_Z + R_1$

$E_{Y-2Z} = E_Y - E_{2Z} + R_2$
$= E_Y - ZE_2 + 2E_Z + R_1 + R_2$

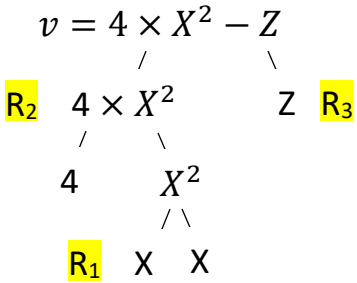
$E_{X+4} = E_X + E_4 + R_3$

$$E_V = \frac{1}{Y-2Z} E_{X+4} - \frac{X+4}{(Y-2Z)^2} E_{Y-2Z} + R_4$$
$$= \frac{1}{Y-2Z}(E_X + E_4 + R_3) - \frac{X+4}{(Y-2Z)^2}(E_Y - ZE_2 + 2E_Z + R_1 + R_2) + R_4$$
$$= \frac{1}{Y-2Z} E_X - \frac{X+4}{(Y-2Z)^2} E_Y - \frac{X+4}{(Y-2Z)^2} 2E_2 + \left(\frac{R3}{Y-2Z} - \frac{X+4}{(Y-2Z)^2}(R1) - \frac{X+4}{(Y-2Z)^2}(R2) + R4\right)$$

$E_V \leq 0{,}419282 \times 10^{-5}$

$R1 \leq 0.5 \times 10^{-10}$
$R2 \leq 0.5 \times 10^{-5}$
$R3 \leq 0.5 \times 10^{-4}$
$R4 \leq 0.5 \times 10^{-5}$

EJERCICIO #3



$E_{X \times X} = XE_X + XE_X + R_1$
$= 2XE_X + R_1$

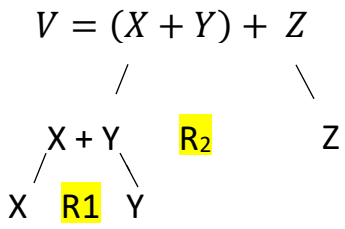
$E_{4xX^2} = X^2E_4 + 4E_X^2 + R_2$
$= X^2E_4 + 4(2XE_X + R_1) + R_2$
$= X^2E_4 + 8XE_X + 4R_1 + R_2$

$E_V \leq E_{4 \times X^2} - E_Z + R_3$
$\leq X^2E_4 + 8XE_X + 4R_1 + R_2 - E_Z + R_3$

$E_V \leq 0{,}8314 \times 10^{-2}$

$R1 \leq 0.5 \times 10^{-4}$
$R2 \leq 0.5 \times 10^{-4}$
$R3 \leq 0.5 \times 10^{-5}$

EJERCICIO #4



$E_{X+Y} = E_X + E_Y + R_1$

$E_V \leq E_{X+Y} + E_Z + R_2$
$\leq E_X + E_Y + E_Z + R_1 + R_2$

$E_V \leq 0{,}631 \times 10^{-4}$

$R1 \leq 0.5 \times 10^{-5}$
$R2 \leq 0.5 \times 10^{-5}$