

2 Daniel de Sousa Cipriano RA: 233228 m5214C atividade 1

① a) Igualando as potências à de maior valor (4), temos:

$$X = 0,7237 \times 10^4; \quad y = 0,00000002145 \times 10^4; \quad z = 0,0002585 \times 10^4$$

Resposta: $X + y + z = 0,723958^{521} \times 10^4 //$

Truncando: $0,723958^{521} \times 10^4 \rightarrow 0,7239 \times 10^4 //$

assim para a erro absoluta: $E_{A_{X+y+z}} = |(X+y+z) - \overline{(X+y+z)}|$

Para $X + y + z = 0,723958521 \times 10^4$

$$\overline{X + y + z} = 0,7239 \times 10^4$$

assim $E_{A_{X+y+z}} = |0,723958521 \times 10^4 - 0,7239 \times 10^4|$

$$= 0,000058521 \times 10^4 //$$

com isso a erro relativa $E_{R_{X+y+z}} = \frac{|E_{A_{X+y+z}}|}{|\overline{(X+y+z)}|}$

$$E_{R_{X+y+z}} = \frac{|0,000058521 \times 10^4|}{|0,7239 \times 10^4|}$$

$$= \boxed{0,00008083}$$

$$= \boxed{0,8083 \times 10^{-4}}$$

b) Determinar a mesma notação de (a)

$$(X - y - z) = 0,7237 \times 10^4 - 0,00000002145 \times 10^4 - 0,0002585 \times 10^4$$

$$= 0,723441478 \times 10^4 //$$

$$\overline{(X - y - z)} = 0,7234 \times 10^4 //$$

$$E_{A_{X-y-z}} = |0,723441478 \times 10^4 - 0,7234 \times 10^4|$$

$$= 0,000041478 \times 10^4 //$$

$$E_{R_{X-y-z}} = \frac{|0,000041478 \times 10^4|}{|0,7234 \times 10^4|} = \boxed{0,00005732}$$

$$= \boxed{0,5732 \times 10^{-4}}$$

$$c) 2X - X = 2(0,7237 \times 10^4) - 0,7237 \times 10^4$$

$$= 1,4474 \times 10^4 - 0,7237 \times 10^4$$

adequando ao sistema:

$$= 0,14474 \times 10^5 - 0,07237 \times 10^5$$

$$= 0,14474 \times 10^5 - 0,07237 \times 10^5$$

$$= \cancel{0,07233 \times 10^5} // 0,07237 \times 10^5 //$$

$$\overline{2X - X} = 0,1447 \times 10^5 - 0,07237 \times 10^5 = 0,07233 \times 10^5 //$$

$$E_{A_{2X-X}} = |0,07237 \times 10^5 - 0,07233 \times 10^5|$$

$$= 0,00004 \times 10^5 //$$

$$E_{R_{2X-X}} = \frac{|0,0004 \times 10^5|}{|0,07233 \times 10^5|} = 0,000553 \text{ atm} \\ = \boxed{0,5530 \times 10^{-3}}$$

$$d) (X/\gamma) = \frac{0,7237 \times 10^4}{0,2145 \times 10^{-3}} = 3,373892774 \times 10^7 \\ = 0,3373892774 \times 10^8$$

$$\overline{(X/\gamma)} = 0,3373 \times 10^8$$

$$E_A(X/\gamma) = |0,3373892774 \times 10^8 - 0,3373 \times 10^8| \\ = 0,00008927 \times 10^8 //$$

$$E_R(X/\gamma) = \frac{|0,00008927 \times 10^8|}{|0,3373 \times 10^8|} = 0,0002646 \\ = \boxed{0,2646 \times 10^{-3}}$$

$$e) (1/\gamma)X = \left(\frac{1}{0,2145 \times 10^{-3}} \right) 0,7237 \times 10^4 \\ = 4,662004662 \times 10^3 \cdot 0,7237 \times 10^4 \\ = 3,373892774 \times 10^7 \\ = 0,3373892774 \times 10^8 //$$

$$\overline{(1/\gamma)X} = 0,3373 \times 10^8$$

$$E_A(1/\gamma)X = |0,3373892774 \times 10^8 - 0,3373 \times 10^8| \\ = 0,00008927 \times 10^8 //$$

$$E_R(1/\gamma)X = \frac{|0,00008927 \times 10^8|}{|0,3373 \times 10^8|} = \boxed{0,0002646} \\ \boxed{0,2646 \times 10^{-3}}$$

$$f) \frac{(x \cdot x)}{x} = \frac{(0,7237 \times 10^4 \cdot 0,7237 \times 10^4)}{0,7237 \times 10^4} = 0,7237 \times 10^4$$

$$\overline{\frac{(x \cdot x)}{x}} = 0,7237 \times 10^4$$

$$E_A \left(\frac{x \cdot x}{x} \right) = |0,7237 \times 10^4 - 0,7237 \times 10^4| = 0 //$$

$$E_R \left(\frac{x \cdot x}{x} \right) = \frac{|0|}{|0,7237 \times 10^4|} = \boxed{0}$$

$$g) \frac{(x \cdot y)}{z} = \frac{(0,7237 \times 10^4 \cdot 0,2145 \times 10^{-3})}{0,2585 \times 10^{-1}} = 0,600517021$$

$$\overline{\frac{(x \cdot y)}{z}} = 0,6005 \rightarrow E_A \left(\frac{x \cdot y}{z} \right) = |0,600517021 - 0,6005|$$

$$= 0,00001702$$

$$E_R \left(\frac{x \cdot y}{z} \right) = \frac{|0,00001702|}{|0,6005|} = \boxed{0,2834 \times 10^{-4}}$$

$$h) x \left(\frac{y}{z} \right) = 0,7237 \times 10^4 \left(\frac{0,2145 \times 10^{-3}}{0,2585 \times 10^{-1}} \right) = 0,600517021$$

$$\overline{x \left(\frac{y}{z} \right)} = 0,6005 \rightarrow E_A x \left(\frac{y}{z} \right) = |0,600517021 - 0,6005|$$

$$= 0,00001702$$

$$E_R x \left(\frac{y}{z} \right) = \frac{|0,00001702|}{|0,6005|} = \boxed{0,2834 \times 10^{-4}}$$

② a) Demos
i-

$$\begin{aligned}
 X(y+z) &= 0,5289(0,8012 + 0,6024) \\
 &= 0,5289 \cdot 1,4036 \text{ (normalizando e arredondando)} \\
 &= 0,5289 \cdot 0,1404 \\
 &= 0,07425756 \text{ normalizando e arredondando} \\
 &= \underline{0,7426 \times 10^{-1}} //
 \end{aligned}$$

calculando $Xy + Xz = 0,5289 \cdot 0,8012 + 0,5289 \cdot 0,6024$

$$\begin{aligned}
 &= 0,4238 + 0,3186 \text{ (normalizando e arredondando)} \\
 &= \underline{0,7424} //
 \end{aligned}$$

ii - Demos $(X+y)+z = (0,5289 + 0,8012) + 0,6024$

$$\begin{aligned}
 &= 1,3301 + 0,6024 \\
 &= 0,1330 \times 10^1 + 0,06024 \times 10^1 \\
 &= \underline{0,1932 \times 10^1} //
 \end{aligned}$$

calculando $X + (y+z) = 0,5289 + (0,8012 + 0,6024)$

$$\begin{aligned}
 &= 0,5289 + 0,1404 \times 10^1 \\
 &= 0,05289 \times 10^1 + 0,1404 \times 10^1 \\
 &= \underline{0,1933 \times 10^1} //
 \end{aligned}$$

2) Os itens i e ii demonstram que a propriedade associativa e comutativa verificada nas operações com números reais, não se aplica a aritmética de ponto flutuante, devido ao arredondamento / truncamento durante as operações.