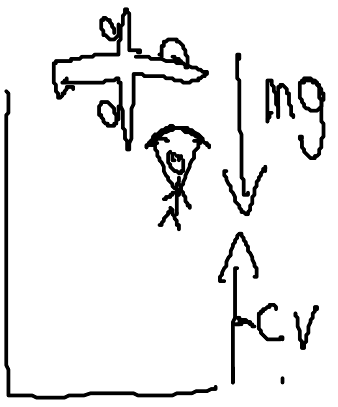
$V_0 = 0$

$$\boxed{\frac{dV}{dt} = mg - cV}$$



$$\int \frac{dv}{mg-cV} = \int dt \to -\frac{\ln|mg-cV|}{c} = t + E$$

$t = 0 \quad V = 0$

$$V(t) = \frac{mg}{c}\left(1 - e^{-\frac{c}{m}t}\right)$$

$$\boxed{\frac{dV}{dt} = mg - cV}$$

$$\frac{dv}{dt} \simeq \frac{\Delta V}{\Delta t}$$

$$\frac{dv}{dt} = \lim_{\Delta t \to 0} \frac{\Delta V}{\Delta t}$$

$$\frac{\Delta V}{\Delta t} = mg - cV(t_i)$$

$$\frac{V(t_{i+1}) - V(t_i)}{\underbrace{t_{i+1} - t_i}} = mg - cV(t_i)$$

$\Delta t = 0.1$

$V(0) = 0$

$$V(t_{i+1}) = (mg - c\cancel{V(t_i)})\Delta t$$

$$V(0.1) = (mg)0.1$$

$$V(0.2) = (mg - cV(0.1))\Delta t$$

Errores

Redondeo

3 cifras

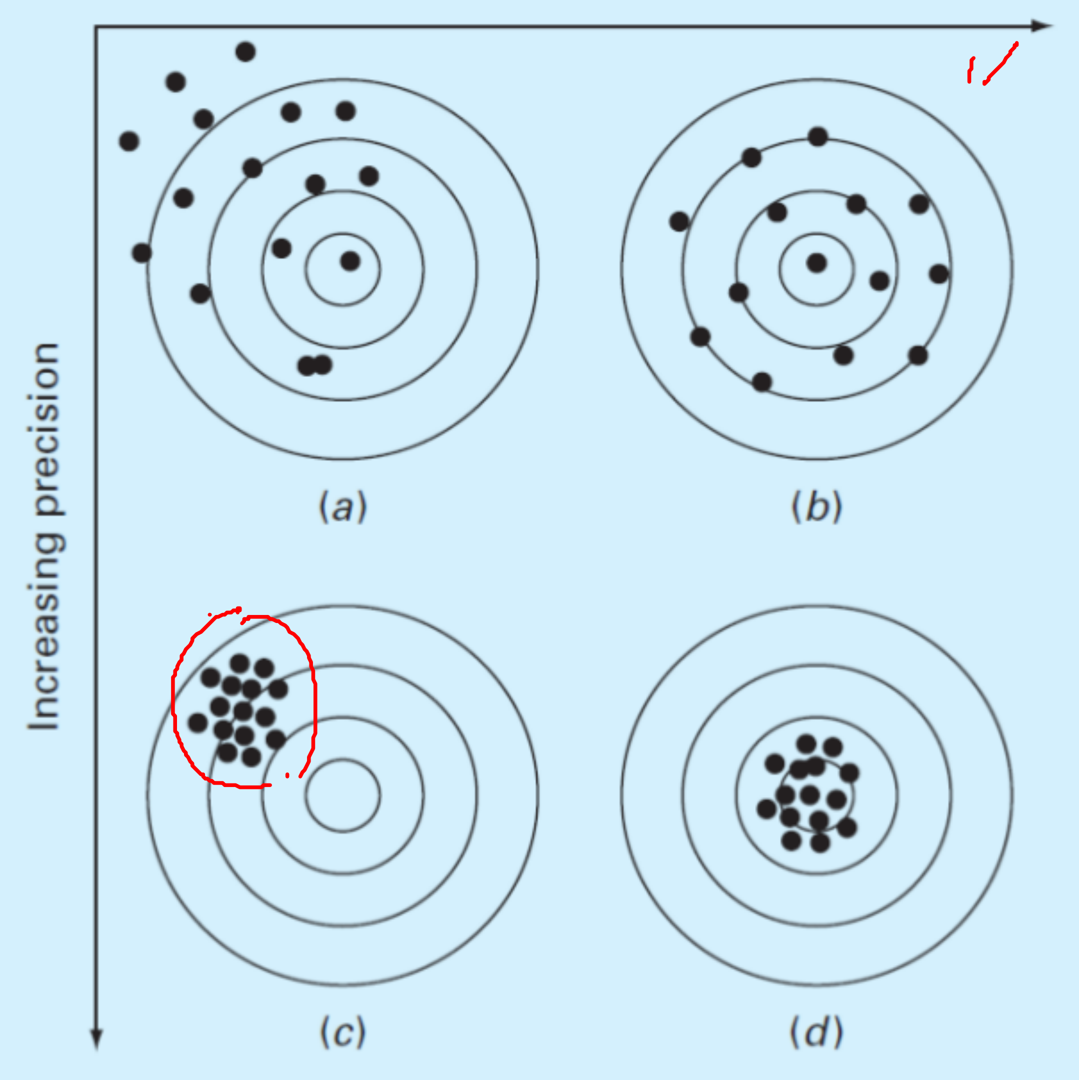
$A = 0,000753896$

$7,53 \times 10^{-4}$

$$\frac{1000 \times (A-1)}{A}$$

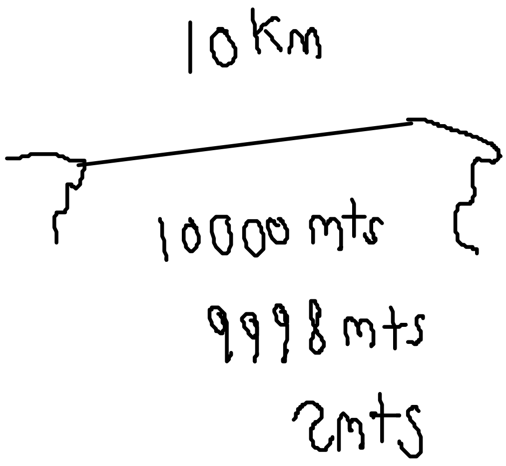
Calculo = $-1325442,905$

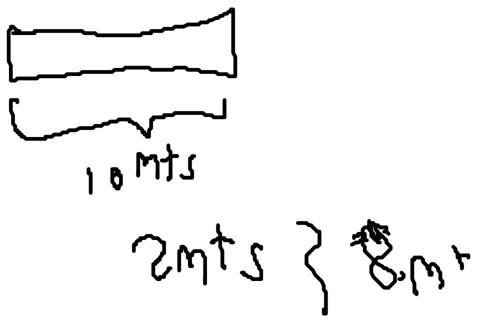
Calculo 3 cifras = $-1327021,248$



Calculo de errores

Error absoluto





Error Relativo

$$\frac{9998-10000}{9998} \times 100 = 0{,}02\%$$

$$\frac{8-10}{8} \times 100 = 25\%$$

Error de aproximación

$$E_a = \frac{Ap_{actual} - A_{posterior}}{Ap_{actual}} \times 100$$

		E_a
1ap	5	→ --
2p.	6	→ 16.66 %
3ap	6.25	→ 4 %
4ap	6.256	→ 0.09 %

Error de truncamiento

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

Serie de Taylor

$$F(a) = \frac{F(a)}{0!}(x-a)^0 + \frac{F(a)'}{1!}(x-a)^1 + \underbrace{\dots + \frac{F(a)^n (x-a)^n}{n!}}_{Error}$$

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

Serie de Macclaurin

$a=0$ $\quad \displaystyle\sum_{n=0}^{\infty} \frac{F^n(0)}{n!} x^n$

$F(x) = 3x^5 + 6x^4 - 3x^3 + 2x^2 + x - 100$

$F'(x) = 15x^4 + 24x^3 - 9x^2 + 4x + 1$

$F''(x) = 60x^3 + 72x^2 - 18x + 4$ $\qquad 1836042$

$F^3(x) = 180x^2 + 144x - 18$

$F^4(x) = 360x + 144$ $\qquad F^6(x) = 0$

$F^5(x) = 360$

n	$F(14)$	E_r	E_a
0	-100	100%	---
1	-86	100%	$\frac{-86+100}{-86} \times 100$ 16,27%
2	306	99,98%	128,1%
3	-7926	100,43%	103,86%
4	222570	87,87%	103,56%
5	1836042	0%	87,87%
6	1836042	0%	6%

$$\sum_{n=0}^{\infty} \frac{F^n(0)}{n!} x^n = \overset{-100}{\frac{F(0)}{0!}(14)^0} + \overset{14}{\frac{F'(0)}{1!}(14)^1} + \overset{392}{\frac{4 \times 14^2}{2!}}$$

$$+ \overset{-8232}{\frac{-18 \times 14^3}{3!}} + \overset{230496}{\frac{144}{4!}(14)^4} + \underset{1613472}{\frac{360(14)^5}{5!}}$$

$$+ \frac{0(14)^6}{6!}$$

Errores del aritmeticos del computador

0, 1

16 = 10000

16 | 2
0 8 | 2
0 4 | 2
0 2 | 2
0 1

int

int o integer

int / integer

32

0 —— $0 \to 0$

1 1 $\quad 1 \to 2^{32} - 1$

Numeros reales

$12 + 0.3$

$12 \,|\, 2$ → $0 \quad 6 \,|\, 2$ → $0 \quad 3 \,|\, 2$ → $1 \quad 1$

1100

$12.03 = 1\times10^{1} + 2\times10^{0} + 0\times10^{-1} + 3\times10^{-2}$

$1100 = 1\times2^{3} + 1\times2^{2} + 0\times2^{1} + 0\times2^{0}$

$1100,01001$

$2^{3}\ 2^{2}\ 2^{1}\ 2^{0}\ 2^{-1}\ 2^{-2}\ 2^{-3}\ 2^{-4}\ 2^{-5}$

$0,05 \rightarrow 0,01875$

$0,0475 \rightarrow 4,75\times10^{-2}$

$\text{Numero}\times 2^{\text{Exp}}$

$\underset{\xrightarrow{3}}{1011,110} = \underbrace{1011110}_{\text{montiza}} \times \underbrace{2}_{\text{Base}}^{\text{Exp}\ -3}$

double / Float
64 / 32

$\underbrace{- - - - - - - -}_{\text{Exp}} \ \underbrace{- - - - - - - -}_{23 \text{ montiza}}$

$x = \underbrace{1,0011 \ldots\ 111}_{100}$

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

0
0.5
1

$$F(x_{i+1}) = \sum_{n=0}^{\infty} \frac{F^n(x_i)}{n!} \overbrace{(x_i - x_{i+1})}^{h}{}^{n}$$

$$F(x_{i+1}) = \sum_{n=0}^{\infty} \frac{F^n(x_i)}{n!} h^n$$

$3x^2 + 8x + 6$ $\qquad h = 2$

Ver: 34 $\qquad x = 0$

6

n	F(2)	E_r	E_a
0	6	82,35%	--
1	22	35,29%	72,27%
2	34	0%	35,29%

$$F(x_{i+1}) = \sum_{n=0}^{\infty} \frac{F^n(x_i)}{n!} h^n \Rightarrow$$

$$\frac{F(0)}{0!}2^0 + \frac{F^1(0)}{1!}2^1 + \frac{F^2(0)}{2!}2^2$$

8 $\qquad$ 6

$$F(x) = \sum_{n=0}^{\infty} \frac{F^n(a)}{n!}\overbrace{(x-a)}^{h}{}^{n} = \frac{F^0(a)h^0}{0!} + \frac{F^1(a)h^1}{1!} + \dots + \frac{F^n(a)h^n}{n!}$$

$$+ \frac{F^{n+1}(a)h^{n+1}}{(n+1)!} + \cdot$$

Cte

$$R_{(n)} = \frac{F^{n+1}(\epsilon)h^{n+1}}{(n+1)!} \qquad O(h^{n+1})$$

$h = 0.5$ $\qquad E_r < 3\%$ $\qquad E < 0,03$

$0.5^6 = 0,015625$ $\qquad n = 5$