un-sta-ble

$$\{\,x_0 = 1, \quad x_1 = 1/3 \quad x_{n+1} = \frac{13}{3}x_n - \frac{4}{3}x_{n-1}.$$

$x_n :=$
$(1/3)^n$

MARC-32

$x_{15} =$
3.657493

10^8

3^{-15}

x_0
x_1
$x_0 =$
$1 +$
ϵ_0
$x_1 =$
$1/3 +$
ϵ_1

$$x_2 = \frac{13}{3}\left(\frac{1}{3} + \epsilon_1\right) - \frac{4}{3}(1+\epsilon_0) = \frac{1}{9} + \frac{13}{3}\epsilon_1 - \frac{4}{3}\epsilon_2.$$

$13/3$

ex-po-nen-tially

$x_{n+1} =$
$\dfrac{13}{3}x_n -$
$\dfrac{4}{3}x_{n+1}$

$x_n = A(1/3)^n + B \cdot 4^n.$

A, B
x_0, x_1
$x_0 =$
1
$x_1 =$
$1/3$

$$\{\,1 = A + B \quad 1/3 = 1/3A + 4B \quad \{\,A = 1 \quad B = 0.$$

$x_0 =$
$1 +$
ϵ_1
$x_1 =$
$1/3 +$
ϵ_2

$$\{\,1+\epsilon_1 = A + B \quad 1/3 + \epsilon_2 = 1/3A + 4B \quad \{\,A = 1 + \delta_1 \quad B = \delta_2.$$

$x_n =$
$A(1/3)^n +$
$B \cdot$
4^n

$x_n^* = (1+\delta_1)(1/3)^n + \delta_2 \cdot 4^n,$

$x_0 =$
1
$x_1 =$
4
$x_n =$
$A(1/3)^n +$
$B \cdot$
4^n
$A =$
0
$B =$
1
$x_n =$
4^n
$x_n^* =$
$\delta_1(1/3)^n +$
$(1 +$
$\delta_2)4^n$
$x_n^* -$
$x_n =$
$\delta_1(1/3)^n +$
$\delta_2 \cdot$
4^n

$$\frac{x_n^* - x_n}{x_n} \quad \frac{\delta_1(1/3)^n}{4^n} + \delta_2 \approx \delta_2.$$

x_n
x_n

ill con-di-tioned

quan-ti-ta-tive