$a_0, a_1, a_2, \dots, a_n, \dots$

$\to a = 10\ m/s^2$, $v_0 = 0\ m/s$

$$x(t) = \cancel{x_0} + \cancel{v_0 t} + \frac{at^2}{2} = \frac{10}{2}\cdot t^2 = 5t^2$$

$t_0 = 0,\ t_1 = 0.1,\ t_2 = 0.2$

$x_0 = 0,\ x_1 = 0.05,\ x_2 = 0.1$

$\quad\quad\ \ x(t_1) \quad\quad x(t_2)$

$$x_n = 5t_n^2 = 5\cdot(0.1n)^2$$

$$\boxed{x_n = 0.05\cdot n^2}$$

Collatz: Dado $x \in \mathbb{N}$, $x > 1$,

$$a_0 = x \ ; \quad a_{n+1} = \begin{cases} a_n/2, & a_n \text{ é par} \\ 3a_n + 1, & a_n \text{ é ímpar} \end{cases}$$

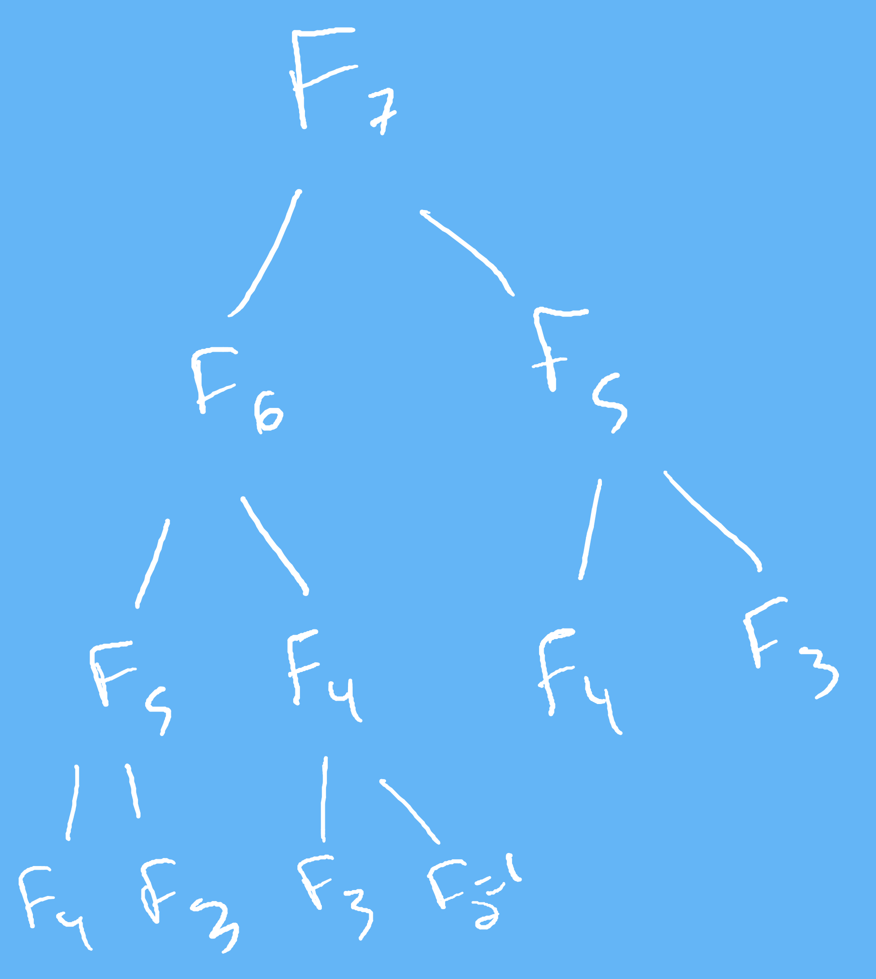
$x = 3$,

$a_0 = 3,\ a_1 = 10,\ a_2 = 5,\ a_3 = 16,\ a_4 = 8,\ a_5 = 4,\ a_6 = 2$

$\boxed{a_7 = 1}$

$F_1 = F_2 = 1$, $\quad F_{n+1} = F_n + F_{n-1}$

1, 1, 2, 3, 5, 8, 13, 21, 34, 55



Séries

$$S = \sum_{k=1}^{\infty} a_k \ ; \quad S_n = \sum_{k=1}^{n} a_k$$

$$S_{n+1} = S_n + a_{n+1}$$

Polinômio de Taylor de grau n de f em torno de a:

$$p_n(x) = f(a) + f'(a)(x-a) + \frac{f''(a)}{2}(x-a)^2 + \frac{f'''(a)}{3!}(x-a)^3 + \dots + \frac{f^{(n)}(a)}{n!}(x-a)^n.$$

$f(x) = e^x \Rightarrow f^{(n)}(x) = e^x$, $a = 0$

$$p_n(x) = 1 + 1\cdot x + \frac{1}{2}\cdot x^2 + \frac{1}{3!}x^3 + \dots + \frac{1}{n!}x^n.$$

$f(1) = e$, $p_n(1) \approx e$; $\quad e^x \approx 1 + x + \frac{x^2}{2} + \frac{x^3}{3!} + \dots + \frac{x^n}{n!}$

$$a_n = \frac{x^n}{n!} = \frac{x}{n}\cdot\frac{x^{n-1}}{(n-1)!} = \frac{x}{n}\cdot a_{n-1}$$

$$e^{-1} \approx 1 - 1 + \frac{1}{2} - \frac{1}{6} + \frac{1}{24} - \frac{1}{120}$$

$\operatorname{arctg} 1 = \frac{\pi}{4}$; $\quad \frac{d}{dx}\operatorname{arctg} x = \frac{1}{1+x^2}$

$$\frac{1}{1+x^2} = 1 - x^2 + x^4 - x^6 + x^8 - \dots$$

$$\operatorname{arctg} x = \int \frac{1}{1+x^2}\,dx = x - \frac{x^3}{3} + \frac{x^5}{5} - \frac{x^7}{7} + \dots$$

$$\therefore \frac{\pi}{4} = 1 - \frac{1}{3} + \frac{1}{5} - \frac{1}{7} + \frac{1}{9} - \frac{1}{11} + \dots$$