Analiza

1. $f : (-2, 2) \to \mathbb{R}$, $f(x) = \ln \frac{x+2}{2-x} = \ln(x+2) - \ln(2-x)$

$$\sum_{n=0}^{\infty} a_n (x - x_0)^n, \quad a_n = \frac{f^{n}(x_0)}{n!}$$

I calculăm derivata de ordin n

$$f'(x) = \left(\ln \frac{x+2}{2-x}\right)' = \frac{1}{x+2} + \frac{1}{2-x} = \frac{1}{x+2} - \frac{1}{x-2}$$

$$f''(x) = \left(\frac{1}{x+2} - \frac{1}{x-2}\right)' = \frac{1}{(x+2)^2} - \frac{1}{(x-2)^2}$$

$$f'''(x) = \left(\frac{1}{(x+2)^2} - \frac{1}{(x-2)^2}\right)' = \left(\frac{2\cancel{(x+2)}}{(x+2)^{\cancel{3}2}} - \frac{2\cancel{(x-2)}}{(x-2)^{\cancel{3}2}}\right) = 2\left(\frac{1}{(x+2)^2} - \frac{2}{(x-2)^2}\right)$$

$$f^{(IV)}(x) = 4\left(\frac{1}{(x+2)^2} - \frac{2}{(x-2)^2}\right) \Rightarrow$$

$$f^{(n)}(x) = 2^{n-2}\left(\frac{1}{(x+2)^{n-2}}\right.$$