2. [14 points] A function $f(x)$ is defined on the interval $(0, 2)$ by its Taylor series around $x = 1$,

$$f(x) = \sum_{n=0}^{\infty} \frac{1}{2n+1} (x-1)^{2n+1}.$$

a. [3 points] Find $f^{(2025)}(1)$ and $f^{(2026)}(1)$.

Answer: $f^{(2025)}(1) =$ _____ and $f^{(2026)}(1) =$ _____

b. [5 points] Find the degree 7 Taylor polynomial around $x = 1$ for $f(x)$.

Answer: _____

c. [3 points] Find the degree 6 Taylor polynomial around $x = 1$ for $f'(x)$, the **derivative** of $f(x)$.

Answer: _____

d. [3 points] Find a closed-form expression of the derivative $f'(x)$ which applies on the interval $(0, 2)$. Closed form means your answer should not include ellipses or sigma notation.

Answer: $f'(x) =$ _____