

10. [8 points] The Taylor series centered at $x = 0$ for a function $F(x)$ converges to $F(x)$ for all x and is given below.

$$F(x) = \sum_{n=0}^{\infty} (-1)^n \frac{x^{4n+1}}{(2n)!(4n+1)}$$

- a. [3 points] What is the value of $F^{(101)}(0)$?
Make sure your answer is exact. You do not need to simplify.

Answer: $F^{(101)}(0) =$ _____

- b. [3 points] Find $P_9(x)$, the 9th degree Taylor polynomial that approximates $F(x)$ near $x = 0$.

- c. [2 points] Use your Taylor polynomial from part **b.** to compute

$$\lim_{x \rightarrow 0} \frac{F(x) - x}{2x^5}$$