

In class work 21 has questions 1 through 1 with a total of 6 points. Turn in your work at the end of class *on paper*. This assignment is due at *Thursday 9 November 13:20*.

“The place to improve the world is first in one’s own heart and head and hands, and then work outward from there.”

ROBERT PIRSIG

1. For all real numbers x , we have $\sin(x) = \sum_{k=0}^{\infty} \frac{(-1)^k}{(2k+1)!} x^{2k+1}$.

- 2 (a) Find the power series representation for $\sin(x) - x$ centered at zero. **Hint:** When you don’t know where to start, go to your happy place: write the first few terms of the Taylor series for sine centered at zero. Then subtract x .

- 2 (b) For $x \neq 0$, find the *first two nonzero terms* in a power series representation for $\frac{\sin(x)-x}{x^3}$.

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(c) Use the above result to find the *numerical value* of the limit

$$\lim_{x \rightarrow 0} \frac{\sin(x) - x}{x^3}.$$