1. Find the Taylor series (first four non-zero terms) about $x=0$ for the function $f(x) = x \sin(x^3)$.

2. Use a second degree Taylor polynomial to approximate $\sqrt[3]{7.5}$. Simplify your answer into a single fraction.

3. Use a Taylor series to evaluate $\lim_{x \to 0} \frac{e^x - 1 - x}{x^2}$.

4. Use Taylor series (ignoring terms of degree two and higher) to approximate a solution to the equation $e^{3x} + \sin(2x) = -0.5 \cos x$. 