

Math 163
Fall 2023
Assessment 8
Dusty Wilson

Name: _____

*Give me a lever long enough and a fulcrum
on which to place it, and I shall move the
world.*

Archimedes

287-212 BC (mathematician of Syracuse)

No work = no credit

1. Warm-ups

(a) (1 point) $\vec{k} \times \vec{j} =$

(b) (1 point) $\frac{\partial}{\partial y} \sin(x^2 y) =$

(c) (1 point) $\int \sin 2x dx$

2. (1 point) What is the most interesting thing you have done/moved using a lever (see quote above)?
Answer using complete English sentences.

3. (8 points) Use a known Maclaurin series to find a power series representation for $\int \cos x^2 dx$

4. (8 points) Find the radius of convergence of the power series $\sum_{n=0}^{\infty} \frac{n(x-6)^n}{(-7)^n}$

5. (8 points) Find a Taylor Series expansion centered around $x = 1$ for $f(x) = \sqrt[3]{x}$.
6. (4 points) Find a third-degree Taylor approximation for $f(x) = e^{-3x}$ on the interval $-0.2 \leq x \leq 0.2$. Then use Taylor's Inequality (aka The Remainder Estimation Theorem) to estimate the accuracy of the approximation $f(x) = T_3(x)$ when x lies on the given interval.