Welcome back to MAT137 - Calculus with proofs!

- Assignment 10 is due on April 8.
- Test 5 will be on April 22 (Thursday).

- **Before next class:**
  - Watch videos 14.11, 14.13.

Integrals

I want to calculate

$$A = \int_0^1 t^{10} \sin t \, dt.$$

There are two ways to do it. Choose your favourite one:

1. Use integration by parts 10 times.
2. Use power series.

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Estimate A with an error smaller than 0.001.

Add these series

1. $\displaystyle\sum_{n=2}^{\infty} \frac{(-2)^n}{(2n+1)!}$ *Hint:* Think of sin

2. $\displaystyle\sum_{n=0}^{\infty} (4n+1)x^{4n+2}$ *Hint:* $\dfrac{d}{dx}\left[x^{4n+1}\right] = ???$

3. $\displaystyle\sum_{n=0}^{\infty} \frac{1}{(2n)!}$ *Hint:* Write first few terms. Combine e^1 and e^{-1}.

4. $\displaystyle\sum_{n=0}^{\infty} \frac{(-1)^n x^{2n}}{(2n)!(n+1)}$ *Hint:* Integrate

arctan

1. Write the Maclaurin series for $G(x) = \arctan x$

   Hint: Recall that $G'(x) = \frac{1}{1+x^2}$. Then use the geometric series. Then integrate.

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2. What is the radius of convergence of this sequence? Could we have predicted this radius of convergence from the beginning?

3. What is $G^{(137)}(0)$?