Quiz 19 - Math 152

Find the first 4 terms of the Taylor Series of

$$f(x) = e^{\sin x}$$

Solution.

We start by writing derivatives:

$$\begin{aligned} f(x) &= e^{\sin x} \\ f'(x) &= e^{\sin x}\cos x \\ f''(x) &= e^{\sin x}\cos^2 x - e^{\sin x}\sin x \\ f'''(x) &= e^{\sin x}\cos^3 x - 3e^{\sin x}\sin x\cos x - e^{\sin x}\cos x \end{aligned}$$

And we compute:

$$\begin{aligned} f(0) &= 1 \\ f(1) &= 1 \\ f(2) &= 1 \\ f(3) &= 0 \end{aligned}$$

So we have

$$f(x) = e^{\sin x} \approx 1 + x + \frac{x^2}{2}$$

This is a Calculus I problem since we're really only doing derivatives!