Problem 2

(5 points): How close is the approximation $\sin x = x$ when $|x| < 10^{-2}$?

We know $\sin x = x - \dfrac{x^3}{3!} + \dfrac{x^5}{5!} - \cdots$

From the Alternating Series Estimation Theorem (pg. 772).

$\sin x = x$ has $|\text{error}| < \dfrac{x^3}{3!}$, since $\dfrac{x^3}{5!}$ is the next term in the series after x.

$$\Rightarrow |\text{error}| < \dfrac{(10^{-2})^3}{3!}$$