Lecture 3 (9/30/2019)

Last time, we tried to evaluate $\sqrt{8}$ with precision 10^{-9}.
Our strategy was to approximate $f(8)$, where $f(x) = \sqrt{x}$, by Taylor approximation about $x_0 = 9$.
We found that

$$f(8) = p_n(8) + \underbrace{R_n(8)}_{< 10^{-9} \text{ if } n \geq 10}$$

Choose $n = 10$.

$$p_n(8) = f(9) + \sum_{k=1}^{n} \frac{f^{(k)}(9)}{k!} (8-9)^k$$

$$= 3 + \sum_{k=1}^{10} \frac{(-1)^k}{k!} \left(\frac{1}{2} - 0\right)\left(\frac{1}{2} - 1\right) \cdots \left(\frac{1}{2} - (k-1)\right) 3^{1-2k}$$

To program this sum on Matlab, we use two "for" loops.
(see the Matlab file.)

Worksheet problems ...