Question 1 in 2 parts (15 pts) By hand calculate $\cos(1)$ to within $1/100$ of the correct answer.

part (a) (7 points) Calculate how large a degree Taylor polynomial about 0 you'll need to get the desired accuracy.

part (b) (8 points) Calculate the necessary Taylor polynomial (as determined in part (a)), and then use it to approximate $\cos(1)$. 

Question 2 in 3 parts (15 points) In which we learn to calculate \( \pi \) by hand.

part (a) (5 points) Given that the degree 4 Taylor polynomial around 0 for 
\[ f(x) = \frac{1}{1+x^2} \] is 
\[ 1 - x^2 + x^4, \] Write down what \( f^{(n)}(0) \) is equal to for \( n = 0, 1, 2, 3, 4. \)

part (b) (5 points) Use part (a) to calculate the degree 5 Taylor polynomial for \( \arctan(x) \) around 0. (hint: \( \frac{d}{dx} \arctan(x) = \frac{1}{1+x^2} \) and \( \arctan(0) = 0 \))

part (c) (5 points) Given that \( K_5 = 24 \) for the Taylor polynomial in part (b) between 0 and 1, calculate a range of possible values for \( \pi/4 = \arctan(1) \).