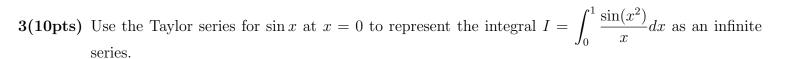
Name: _____

TA's Name: _____

Instructions: You must show supporting work to receive full and partial credits. No text book, notes, formula sheets allowed.

1(10pts) Find the Taylor polynomial $P_2(x)$ and the remainder $R_2(x)$ of $f(x) = \sqrt{x}$ at point x = 4.

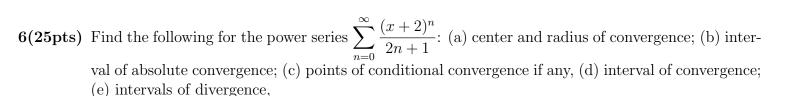
2(10pts) Find the sum $\sum_{n=1}^{\infty} (\arctan(n) - \arctan(n+1))$.



4(10pts) To use the partial sum to approximate the infinite series $\sum_{n=0}^{\infty} (-1)^n \frac{n}{n^2 + 1}$ to the first 3 decimal places (i.e. with an error no greater than 10^{-5}), how many terms do we need for the approximation? Show all work.

5(25pts) (a) Use a comparison test to determine if $\sum_{n=0}^{\infty} \frac{n^2 + 2}{n^3 + 3n + 3}$ converges.

(b) Use the Integral Test to determine if $\sum_{n=1}^{\infty} \frac{1}{n^2} \sin \frac{1}{n}$ converges.



7(10pts) Use the Taylor series $\arctan x = \sum_{n=0}^{\infty} (-1)^n x^{2n+1} / (2n+1)$ to find $f^{(100)}(0)$ if $f(x) = \frac{\arctan x}{x}$ for $x \neq 0$ and f(0) = 1.