I Taylor Series of f centred at a 4th derivative of fat a.  $= \sum_{k=0}^{\infty} f^{(k)}(a) (y-a)^{k}$ a=0 -> Maclaurin Series.

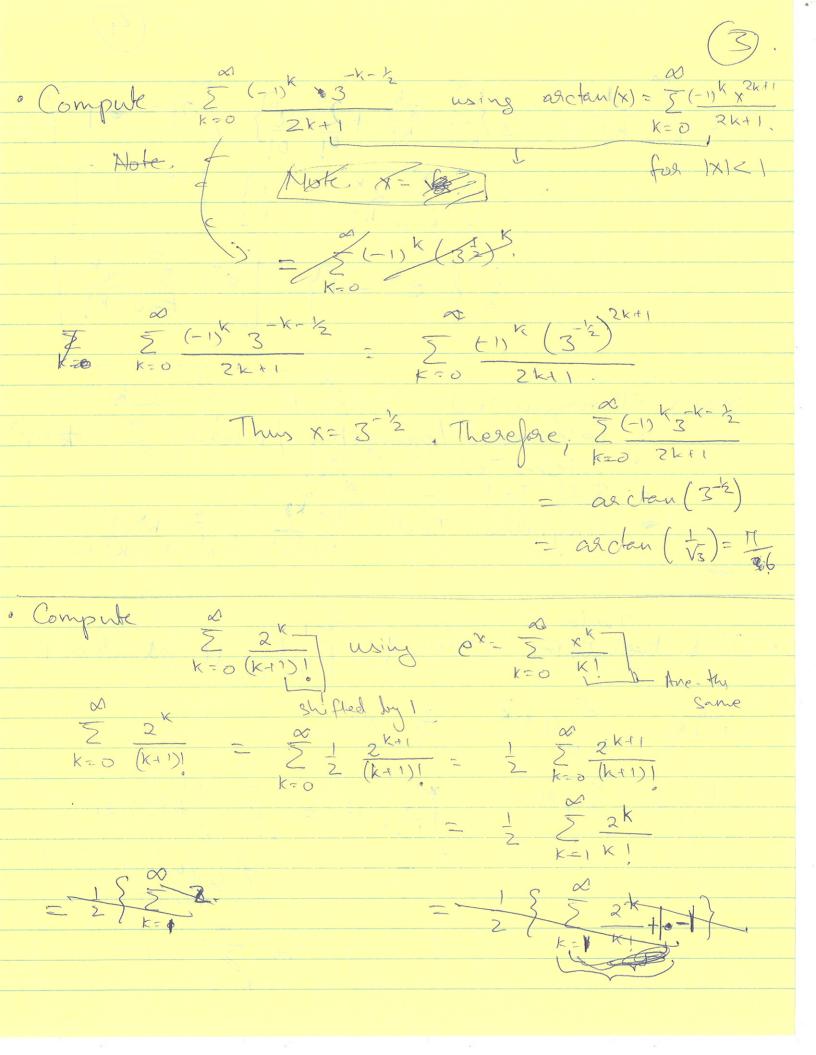
-> Radius of convergence -: Use the 200+ test Ratio test: fin | and | < 1 Taylor Series of arctan(x) about 0.  $f(x) = \arctan(x)$   $f'(x) = \frac{1}{1+x^2} \longrightarrow \text{we know the}$  Madalai Series> we know the Maclaurin Series of and 1 1 dy = arctan(x) Maclausin Series of I is  $\Sigma(-1)^k \mathcal{O}^{2k}$  for -1 < y < 1. Madausin Series of Sityzdy = is. Z scipk yzkdy. = \( \frac{1}{2} \) \( \lambda  $\frac{2}{5}(-1)^{k} \frac{(2k+1)}{2k+1}$ 

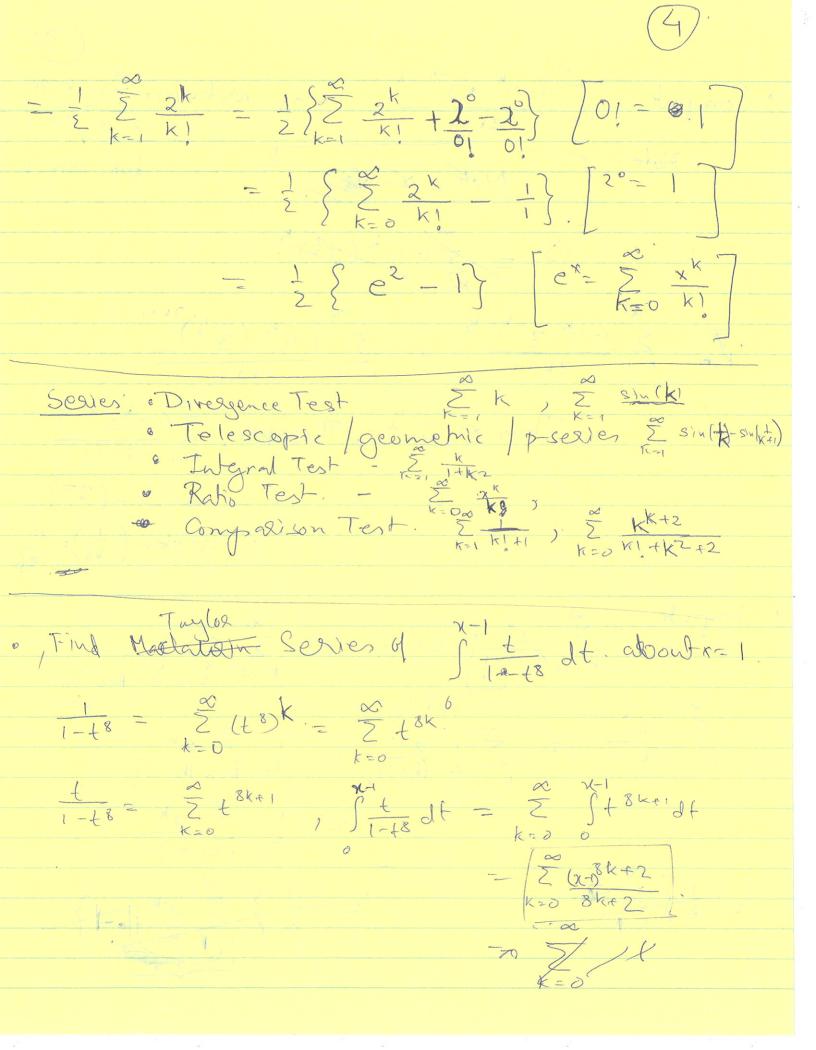
o If Maclausin Series of f is \( \sum \are \are \) \( \tau \) \( \ Madawin Series of h(x)=f(xh) is Eak(xh). Maclauen Series of h(x)=f(x") is a  $\sum_{k=0}^{\infty} a_k(x^k)^k$ . Taylor serves of f is  $\sum_{k=0}^{\infty} a_k (x-a)^k$ ,

11 11 9 is  $\sum_{k=0}^{\infty} b_k (x-a)^k$ . Then " " If fig is  $\sum_{k=0}^{\infty} (a_k + b_k) (x - a)^k$ .

Then "  $\sum_{k=0}^{\infty} (x - a)^k = \sum_{k=0}^{\infty} a_k (x - a)^$  $\int f(x) dx = \int \underbrace{\sum_{k=0}^{\infty} a_k (x-a)^k dx}_{k=0} = \underbrace{\sum_{k=0}^{\infty} a_k \int (x-a)^k dx}_{c}$ In Taylor scries about a series thus we can theat 2 the almost as a almost as a finite Sum.

(In general this is a very subtle issue). Be carefulationt. Radius of Conveggence





 $f(x) = \sum_{x=0}^{\infty} x^{2x}$ What is Find the sadius of convergence for Use Lim (1+L) = e.

(6k+5)!

(1+L) = e.

(1+L) = e. By ratio test the series converes if  $\lim_{K\to\infty} \left| \frac{q_{K+1}}{q_K} \right| < 1$ Lin | 9 km | = Lim (6 (km) 2 km) 3 km 2 (km) 1 km (6 (km) 45) 1 km (6 (km) 45) 1 km (8 km) 2 km 2 km  $\frac{1}{1000} = \frac{1}{1000} = \frac{1$ 2 (group teams).

2 (group teams).

3 depend

4 (k+1) (3) x (k+10)-- (6k+6) = Liw ((+ +)x)2  $k \to \infty$   $\frac{|k+1|}{6k+10} \frac{(k+1)}{(6k+10)} \frac{(-1)}{(6k+10)} \frac{(-1)}{(6k+10)}$ - 02

 $= e^{2} 3\pi \lim_{k \to \infty} \left( \frac{1+k}{k+1} \right) \left( \frac{1+$ - Rendius of convergence is in a.



Find Taylor serves of
· Consider tu function
$F(x) = \begin{cases} a & if x \leq 0 \\ kx^2 & if o \leq x \leq 1 \end{cases}$
Find a k and to for which Fis a of a continuous raindom variable
Valid cumulative distribution function. Find its
Solution: Cd.f. propostion: 1> tim F(x)=1.
But Lim F(x)=b
thus this b=1
2> A'n 7(m)=0
Bw+ lln F(x) = a.
Thus a = 0  3> Continuous and increasing.
Thus Lim F(x) = Lim F(x)
Rut Lim F(X) = b=1 X>1+

