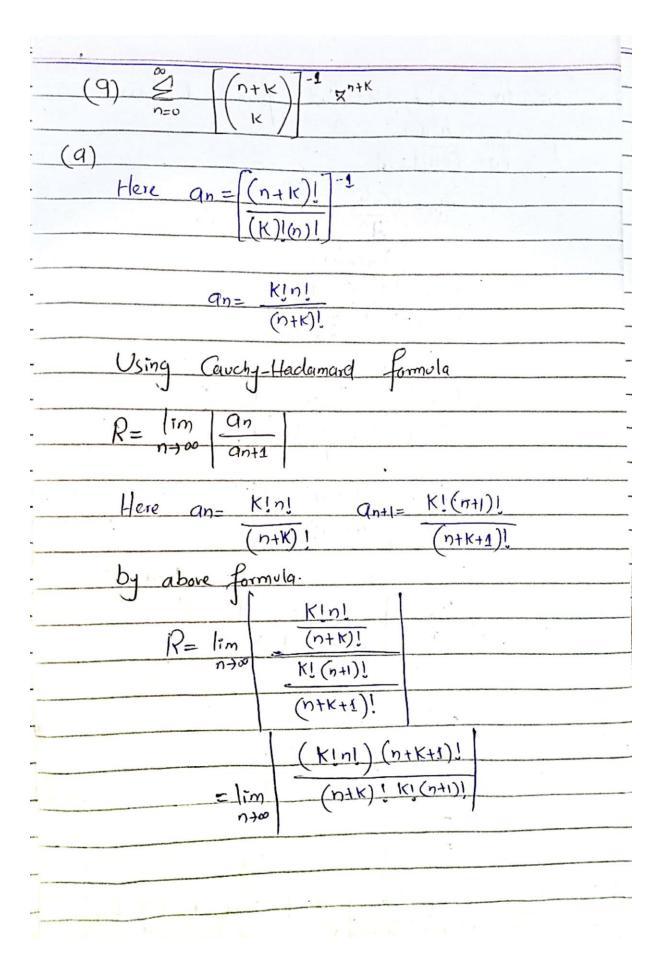
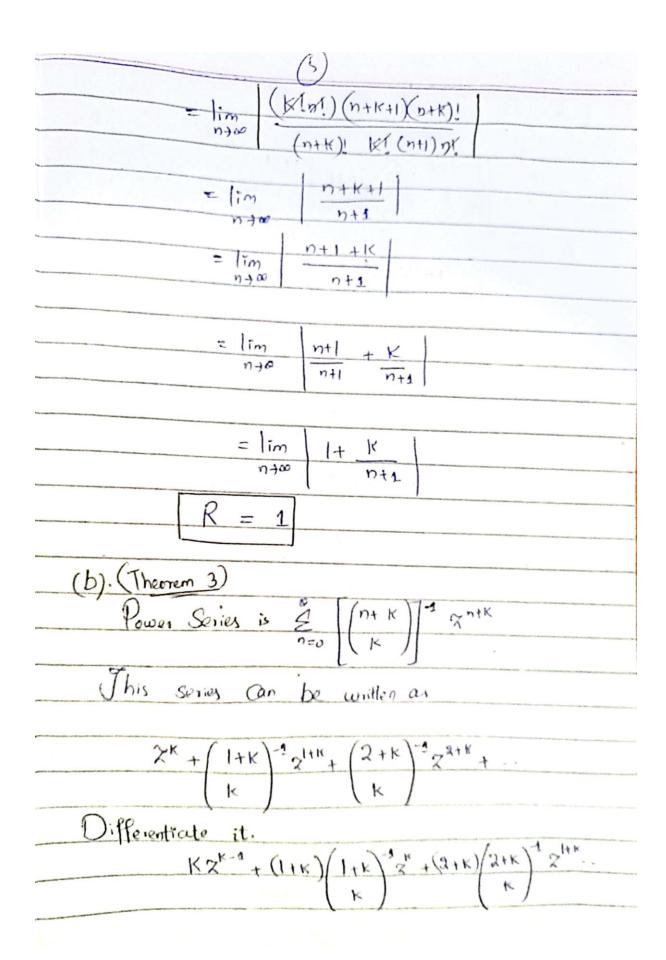
Problem Set 15.3
$(1) \stackrel{\infty}{\subseteq} \eta(n-1) (7-2i)^2 \sigma(1)$
$(4) \underset{n=2}{\overset{\infty}{\smile}} \underbrace{\eta(n-1)}_{3^n} (7-2i)^n = 0$
(9) Compare the Series with (1)
$\sum_{n=0}^{\infty} Q_n(x-z_0)^n \cdots (z)$
N=0
Obtain $a_n = \frac{n(n-1)}{2n}$ , $x_0 = 2i$
3 <sup>n</sup>
According to Cauchy's-Hadamard formula
R= lim an anti
$Q_{n} = \frac{n(n-1)}{3^{n}} \qquad Q_{n+1} = \frac{(n+1)(n+1-1)}{3^{n+1}} = \frac{n(n+1)}{3^{n+1}}$
Therefore, the radius of convergence of series (1) is
$R = \lim_{n \to \infty} \frac{q_n}{q_{n+1}}$
7700 1 51701
$=\lim_{n \to \infty} \frac{n(n-1)}{3^n}$
$\frac{1im}{n+2} \frac{n(n+1)}{3^{n+2}}$
$= \lim_{n \to \infty} \left  n(n-1) 3^{n+1} \right $
n+00 n(n+1) 37

- lim   M(n-1) 3" 32   M(n+1) 3"
$= 3 \lim_{n \to \infty} \frac{(n-1)}{(n+1)}$
$= 3 \lim_{n \to \infty} \left  \frac{n(1-\frac{1}{n})}{n(1+\frac{1}{n})} \right $
$= 3 \lim_{n \to \infty} \frac{\left(1 - \frac{1}{n}\right)}{\left(1 + \frac{1}{n}\right)}$
= 3(1) $= 3$
The series Converges in the open disk  2-2i 23 - of radius 2 and center 2i
Hence, the radius of Convergence of the series (1)  by Couchy-Hadamard formula is [3.]
(b) (Theorem 3)  Differentiale eq.(1) with respect to 2, abtained a,
$\frac{\left(\frac{8}{5} n(n-1)(7-2i)^{2}\right)}{\left(\frac{8}{5} n^{2}(n-1)(7-2i)^{2}\right)} = \frac{2}{5} \frac{n^{2}(n-1)(7-2i)^{2}}{3^{2}} (3)$

So, the Cauchy-Hadamard formula becomes
$R = \lim_{n \to \infty} \frac{n a_n }{(n+1) a_{n+2} }$
$Q_{n} = \frac{n(n-1)}{3^{n}} \qquad Q_{n+1} = \frac{n(n+1)}{3^{n+1}}$
n(n-1)
$\frac{1}{3n} = \frac{1}{3n}$ $\frac{1}{3n} = \frac{1}{3n}$
( ) [n ( 13 27H)
$\frac{1}{n+\infty} = \frac{(n)(n(n-1))}{(n+1)} \frac{3^n}{3^n}$
z   im   n3(n-1) 3.31
n+00 n(n+1)2 3"
$\frac{-1im 3}{n+20} \frac{n^2 \cdot n(1-\frac{1}{n})}{n+20}$
$\frac{-3 \left[ \frac{r_m}{n} \right] \left( \frac{1 - \frac{1}{n}}{n} \right)}{\left( \frac{1 + 1}{n} \right)^2}$
= 3(1)
Henry the radius of Compagning of a second
Hence, the radius of Convergence of Series (1, by term wise differentiation & (theorem 3) is [3]





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	Then Series becomes
	1 (/ 0.1/ )-1
	$\sum_{n=0}^{\infty} \left( \binom{n+K}{k} \right)^{-1} \left( \binom{n+K}{2} \right)^{n+K-1}$
	Now
er meter i School e Holle Met	$a_n = \left(\frac{(n+K)!}{(K)!(n)!}\right)^{-1} (n+K)$
	$=\frac{(n+k) \ k! n!}{(n+k)!}$
	and (arry) KI(arry)
	$a_{n+1} = \frac{(n+k+1) k!(n+1)!}{(n+k+1)!}$
-	Thus.
	$R = \lim_{n \to \infty} \frac{q_n}{q_{n+1}}$
	$= \lim_{n \to \infty} \frac{(n+k)   (n+k) }{(n+k)!}$
	11700
	(n+K+1) K!(n+1)!
	(24K+1);
	=   im (n+K)K!n! (n+K+1)!
	n+00 (n+K+1)K! (n+1)!

