Thus, the series is divergent and diverges to

03 MONDAY JUL 2017

Week 27

Some Well Known and Essential series

(1) Geometric Series: $\sum_{n=1}^{\infty} ar^{n-1} = a + ar + \cdots + ar^{n-1} + \cdots \infty$

if ($a \neq 0$; a, r: constants)

(i) Convergent (Converges to $\frac{a}{1-r}$), if $|r| < 1$ and (ii) divergent, if $|r| \geq 1$.

(2) The p-Series: $\sum_{n=1}^{\infty} \frac{1}{n^p} = 1 + \frac{1}{2^p} + \frac{1}{3^p} + \cdots + \frac{1}{n^p} + \cdots \infty$

is (p constant)

(i) Convergent, if $p > 1$ and (ii) divergent, if $p \leq 1$

(3) Harmonic Series (The p-series with $p = 1$)

: $\sum_{n=1}^{\infty} \frac{1}{n} = 1 + \frac{1}{2} + \frac{1}{3} + \cdots + \frac{1}{n} + \cdots \infty$

is divergent series.

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2	3	4	5	6	7	8	
9	10	11	12	13	14	15	
16	17	18	19	20	21	22	
23	24	25	26	27	28	29	
S	M	T	W	T	F	S	

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The Series

$$\sum_{n=2}^{\infty} \frac{1}{n(\log n)^p} = \frac{1}{2(\log 2)^p} + \frac{1}{3(\log 3)^p} + \cdots \infty$$

is convergent or divergent according as $p>1$ or $p \leq 1$

Example! —

(i) $1 + \frac{1}{\sqrt{2}} + \frac{1}{\sqrt{3}} + \cdots \infty$ $(p = \frac{1}{2} < 1)$ is divergent

(ii) $1 + \frac{1}{2} + \frac{1}{3} + \cdots + \infty$ ($p = 1$, i.e. Harmonic series) is divergent.

(iii) $1 + \frac{1}{2^2} + \frac{1}{3^2} + \cdots \infty$ $(p = 2 > 1)$ is Convergent

(iv) $1 + \frac{1}{2^7} + \frac{1}{3^7} + \cdots \infty$ $(p = 7)$ is Convergent

(v) $1 + \frac{1}{2^{5/2}} + \frac{1}{3^{5/2}} + \cdots \infty$ $(p = \frac{5}{2} > 1)$ is Convergent.