

$$n^2 \sum_{r=2}^n (r+1)^{r+1} \frac{1}{r \log n}$$

Date 28/08/2012

$\sum x^{\log_e n}$ is convergent for $n \in I$

then

1

$$I = (0, \frac{1}{e})$$

2

$$I = (\frac{1}{e}, e)$$

3

$$I = (1, e)$$

4.

$$I = (0, e)$$

$$\underline{[a^{\log b} = b^{\log a}]}$$

$$\sum x^{\log_e n} = \sum n^{\log_e x} = \sum \frac{1}{n^{-\log_e x}} = \sum \frac{1}{n^{\log_e (1/x)}}$$

$$= \sum \frac{1}{n^p} \quad ; \quad p = \log_e (1/x)$$

$\therefore$ is convergent if $p > 1$
 $\log_e \frac{1}{x} > 1$

$$\frac{1}{x} > e \Rightarrow \frac{1}{e} > x$$

$$0 < x < \frac{1}{e} \Rightarrow I \in \underline{(0, \frac{1}{e})}$$