

(iii) If  $r=1$ , the series takes the form  $a + a + \dots \infty$ , so that

$$S_n = na \quad \text{and} \quad \lim_{n \rightarrow \infty} S_n = \infty.$$

Thus, the series is divergent and diverges to  $\pm\infty$ , accordingly as  $a \geq 0$ ,

(iv) If  $r=-1$ , the series takes the form  $a - a + a - a + \dots \infty$ , so that

$$S_n = \begin{cases} 0, & \text{if } n \text{ be even} \\ a, & \text{if } n \text{ be odd.} \end{cases}$$

Hence  $\lim_{n \rightarrow \infty} S_n$  does not exist (having no definite value), consequently the series diverges.