

NAME:

STUDENT NO:

**Q-4)** Find all values of  $x$  for which the power series  $\sum_{n=2}^{\infty} \frac{7^n}{n \ln n} x^n$  converges.

**Solution:**

Use ratio test for the absolute values.  $\frac{|a_{n+1}|}{|a_n|} = \frac{n \ln n}{(n+1) \ln(n+1)} 7|x| \rightarrow 7|x|$  as  $n \rightarrow \infty$ .

For absolute convergence we must have  $|x| < 1/7$ .

When  $x = 1/7$ ,  $a_n = 1/(n \ln n)$ , and the series diverges by the integral test.

When  $x = -1/7$ ,  $a_n = (-1)^n/(n \ln n)$ , and the series converges by the alternating series test.

The series converges only for  $x \in [-1/7, 1/7)$ .