

WRITE YOUR NAME:

MAC 2312 Quiz 17
Tuesday March 26th

Determine whether the series converges or diverges.

$$\sum_{n=2}^{\infty} \frac{1}{n \ln n}$$

Notice $f(x) = \frac{1}{x \ln x}$ is positive and decreasing

(because x and $\ln x$ are both positive and increasing).

So we can use INTEGRAL TEST. Compare with $\int_2^{\infty} \frac{1}{x \ln x} dx$.

Consider $\int_2^M \frac{1}{x \ln x} dx$. Sub $u = \ln x \Rightarrow du = \frac{1}{x} dx$

If $x=2$ then $u = \ln 2$

If $x=M$ then $u = \ln M$

$$\int_{x=2}^{x=M} \frac{1}{\ln x} \cdot \underbrace{\frac{1}{x} dx}_{du} = \int_{u=\ln 2}^{u=\ln M} \frac{1}{u} du = \left[\ln|u| \right]_{u=\ln 2}^{u=\ln M}$$

$$= \underbrace{\ln|\ln M|}_{\rightarrow \infty} - \underbrace{\ln|\ln 2|}_{\text{just a number}} \quad \text{DIVERGES}$$

So the given series
also DIVERGES