

MATH 1100-A 2008 Quiz 21  
March. 31, 2009  
Sections 11.1, 11.2, 11.3.

Determine whether the series is convergent or divergent.

1.  $\sum_{n=1}^{\infty} e^{\frac{1}{n}}$ . (2 pts)

*Solution:* Since

$$\lim_{n \rightarrow \infty} e^{\frac{1}{n}} = e^0 = 1 \neq 0$$

the series is divergent by the Divergence Test. □

2.  $\sum_{n=2}^{\infty} \frac{1}{n(\ln n)^3}$ . (3 pts)

*Solution:* We consider the integral

$$\int_2^{\infty} \frac{1}{x(\ln x)^3} dx.$$

Let  $u = \ln x$ .  $du = \frac{1}{x} dx$ .

$$\begin{aligned} &= \int_{\ln 2}^{\infty} \frac{du}{u^3} = \left[ -\frac{1}{2} \frac{1}{u^2} \right]_{\ln 2}^{\infty} \\ &= \frac{1}{2(\ln 2)^2} \end{aligned}$$

The integral is convergent. Therefore, the series is convergent by the Integral Test. □

*If you send an email to [bzhou@trentu.ca](mailto:bzhou@trentu.ca) with “MATH 1100A: Easter Egg” in the subject line, and your name and student number in the body of the email by 1:00 pm, April 16, I will add one point to your Quiz 21 mark.*