

MTH142 - FALL 2014

QUIZ - 8

Last Name:**First Name:****Person #:****Problem:** Use the **Comparison Test** to determine whether each of the following series is convergent or divergent.

(a) (5 pts)

$$\sum_{n=1}^{\infty} \frac{(0.5)^{n-1}}{n}$$

Note that for any $n \geq 1$,

$$\frac{(0.5)^{n-1}}{n} \leq (0.5)^{n-1}.$$

Since

$$\sum_{n=1}^{\infty} (0.5)^{n-1}$$

is a convergent geometric series ($r = 0.5 < 1$), by the Comparison Test, $\sum_{n=1}^{\infty} \frac{(0.5)^{n-1}}{n}$ is also convergent.

(b) (5 pts)

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

Note that $\frac{1}{n} < \frac{n+1}{n^2}$ for any $n \geq 1$ since

$$\frac{1}{n} < \frac{n}{n^2} < \frac{n+1}{n^2}.$$

But

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

is the harmonic series, which is divergent. Hence, by the Comparison Test, so is $\sum_{n=1}^{\infty} \frac{n+1}{n^2}$.