Exercise 1 (6 points)**.** Consider the series $\sum_{n=1}^{\infty} \frac{1}{n^{3p}}$. For what values of $p \in \mathbb{R}$ does the series **converge**?

Exercise 2 (6 points)**.** Suppose $q \in \mathbb{R}$ and consider the geometric series $\sum_{n=1}^{\infty} \frac{2^{qn}}{3^n}$.

Find the common ratio and determine **for what values of q does the series converge**. [Your answer should be an inequality depending of q.]

Exercise 3 (8 points)**.** The series $\sum_{n=1}^{\infty} \frac{1}{n^{1+\frac{1}{n}}}$ is divergent. **Explain why** it diverges using one of the convergence tests we've seen in class. [*Hint:* $\sqrt[n]{n} \to 1$ *as* $n \to \infty$.]