Math 1221: Recitation 8 (R)

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(1) Solve the following.

    (a) Does the following series converge or diverge? Briefly explain your answer.

$$\sum_{n=1}^{\infty} 3^{-\frac{10}{n}}, \quad \text{and} \quad \sum_{n=1}^{\infty} 3^{\frac{10}{n}}, \quad \text{and} \quad \sum_{n=1}^{\infty} 3^{-\frac{n}{10}}$$

    (b) Comment on the convergence or the divergence of

$$\sum_{n=1}^{\infty} \left(\frac{\ln n}{n} \right)^2$$

    (c) Does the following converge or diverge

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

(2) Solve the following questions. **(Do any one of them)**.

    (a) Use the comparison test to determine whether the following series converge. *Hint: Compare with* $\frac{1}{n}$, $\frac{1}{n^2}$ *and* $\frac{1}{n^{\frac{3}{2}}}$ *and see which works.*

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

(b) Find $\lim \frac{1}{n^{\frac{1}{n}}}$. Use this fact to determine whether the following series converges or diverges.

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

(3) **(Bonus)** Solve any two of them.

(a) Does the following series converge or diverge?

$$\sum_{n=1}^{\infty} \frac{1}{4^n - 3^n}$$

(b) Determine whether the series converges or diverges.

$$\sum_{n=1}^{\infty} \frac{n + \ln n}{n^2 + 8n - 2}$$

(c) State whether the series converges absolutely, conditionally, or not at all.

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