MATH 31B: Week 8

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Question 1. Use the definition of series to find the value of the series $\sum_{n=1} \frac{1}{4n^2-1}$ if it converges. Hint: partial fractions.

Question 2. Which of the following inequalities can be used to study the convergence of $\sum_{n=1} \frac{1}{n^2+\sqrt{n}}$?

$$\frac{1}{n^2+\sqrt{n}} \leq \frac{1}{n^2} \quad \text{or} \quad \frac{1}{n^2+\sqrt{n}} \leq \frac{1}{\sqrt{n}}$$

Explain and then determine whether the series converges or not.

Question 3. Use the limit comparison test to determines whether the series $\sum_{n=1}^{\infty} \frac{2n^3+3n}{n^6+n^5+\sqrt{n}}$ converges or diverges.

Question 4. Determine whether the following series converge or diverge.

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

(b) $\sum_{n=1}^{\infty} \frac{1}{n2^n}$

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

(d) $\sum_{n=1}^{\infty} \frac{4}{n!+4^n}$

(e) $\sum_{n=1}^{\infty} \frac{n!}{n^3}$