1. Determine whether the series \( \sum_{n=1}^{\infty} \frac{1}{n^{2/3}} \) converges or diverges.

(Using a theorem from Tuesday, you should be able to give a two sentence reason without actually carrying out any tests.)

2. Determine whether the series \( \sum_{n=13}^{\infty} \frac{178}{n^{7/3}} \) converges or diverges. Write your reasoning in a mathematically and notationally correct form.

(This one is nearly as easy as the first problem.)

3. Use the Integral Test to determine whether the series \( \sum_{n=1}^{\infty} \frac{1}{16n^2 + 1} \) converges. You will use a suitable function \( f \); make sure to check that your choice of \( f \) satisfies the two conditions it is supposed to.

(You should not need methods from Math 251 to check the hypotheses: they follow quickly from ordinary algebra.)

Date: 26 April 2023.
4. Use the Integral Test to determine whether the series \( \sum_{n=1}^{\infty} \frac{[\ln(n)]^3}{n} \) converges. You will use a suitable function \( f \); make sure to check that your choice of \( f \) satisfies the two conditions it is supposed to.

(You will need methods from Math 251 to check the hypotheses of the integral test.)

5. Determine whether the series \( \sum_{n=1}^{\infty} \left( \sqrt[3]{11 + \frac{781}{n}} - \sqrt[3]{11 + \frac{781}{n+1}} \right) \) converges or diverges. If it converges, what is the sum? Write your reasoning in a mathematically and notationally correct form.

6. Determine whether the series \( \sum_{n=13}^{\infty} \frac{178}{n^{7/3}} - \frac{1}{4^n} \sum_{n=13}^{\infty} \left( \frac{178}{n^{7/3}} + \frac{1}{4^n} \right) \) converges or diverges. Write your reasoning in a mathematically and notationally correct form.