Each problem is worth 4 points unless otherwise specified. This worksheet is worth 32 points.

1. The series \( \sum_{n=1}^{\infty} a_n \) converges to 10. Answer the following questions.

   a) Is there anything you can tell from the first term?

   b) What can you tell from the thousandth term of the series, \( a_{1000} \)?

   c) What can you tell about the sum, \( S_{500} \), of the first 500 terms?

   d) To what value does the sequence of partial sums \( \{S_n\} \) converge?
2. Does the series $\sum_{n=0}^{\infty} \frac{3^n+1}{4^n-1}$ converge or diverge?  
If it converges, to what number does it converge?

3. Does the series $\sum_{n=0}^{\infty} \frac{n^3}{2n^3+1}$ converge or diverge?  
Explain carefully.

4. Does the series $\sum_{n=1}^{\infty} \frac{1}{n^2+1}$ converge or diverge?  
Explain carefully.
5. Does the series \( \sum_{n=1}^{\infty} (-1)^n \frac{n^3}{3^n} \) converge or diverge? Explain carefully.

6. Does the series \( \sum_{n=1}^{\infty} \frac{n^3}{7^n} \) converge or diverge? Explain carefully.

7. Does the series \( \sum_{n=1}^{\infty} \frac{(-4)^n}{n^2 5^n} \) converge or diverge? Explain carefully.