Name:

Instructions: Upload a pdf of your submission to **Gradescope**. This worksheet is worth 20 points: up to 8 points will be awarded for accuracy of certain parts (to be determined after the due date) and up to 12 points will be awarded for completion of parts not graded by accuracy.

(1) For each of the series below, determine if there's a p-series or a geometric series that can be used for a Comparison Test. Explicitly show a justification as to why you can or can't use it for the Comparison Test. If it exists, apply the **Comparison Test** on the series and interpret the result.

(a) $\displaystyle\sum_{n=1}^{\infty} \frac{1}{n^4 + n^3 + n^2}$

(b) $\displaystyle\sum_{n=3}^{\infty} \frac{1}{n - 10}$

(c) $\displaystyle\sum_{n=0}^{\infty} \frac{1}{2^n + 1}$

(d) $\displaystyle\sum_{n=1}^{\infty} \frac{3^n}{2^n - 1}$

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

(2) Use the **Limit Comparison Test** to determine the convergence of the following series. Identify the series $\sum b_n$ being used for the Limit Comparison Test.

Note that there may be other methods to determine the convergence of the following series. However, this problem tests your knowledge and understanding of the Comparison Test, not the Limit Comparison Test.

(a) $\displaystyle\sum_{n=1}^{\infty} \frac{1}{n+10}$

(b) $\displaystyle\sum_{n=3}^{\infty} \frac{1}{n^4 - n^3 - n^2}$

(c) $\displaystyle\sum_{n=0}^{\infty} \frac{1}{2^n - 1}$

(d) $\displaystyle\sum_{n=1}^{\infty} \frac{2n^2 + 3n}{\sqrt{5 + n^5}}$

(e) $\displaystyle\sum_{n=1}^{\infty} \frac{4^{n+1}}{3^n - 2}$