1. **Sequences / Series.**

   \[ A = \left\{ \frac{1}{2}, \frac{1}{4}, \frac{1}{8}, \ldots \right\} \quad \text{general form} \quad a_n = \frac{1}{2^n} \]

   \[ B = \left\{ \frac{1}{2}, \frac{1+1}{2}, \frac{1+1+1}{2}, \ldots \right\} \quad \text{general form} \quad a_n = \sum_{k=1}^{n} \frac{1}{2^k} \]

2. **Convergent / Divergent**

   \[ \lim_{n \to \infty} a_n = \]

   **Ex. 1.**
   \[ \lim_{n \to \infty} \frac{(bn-1)!}{(bn+1)!} = \lim_{n \to \infty} \frac{(bn-1)!}{(bn+1)(bn)!} = \frac{1}{b} \to 0 \to a_n = \frac{(bn-1)!}{(bn+1)!} \quad \text{Conv.} \]

   **Ex. 2.**
   \[ \lim_{n \to \infty} \frac{(-2)^n}{7^n} = \lim_{n \to \infty} \frac{-2^n}{7^n} \to 0 \to a_n = \frac{(-2)^n}{7^n} \quad \text{Conv.} \]

   **Ex. 3.**
   \[ \lim_{n \to \infty} \frac{n^3}{2n^2 + 2n + 1} \quad \text{DNE} \]
   \[ \lim_{n \to \infty} \frac{n^4}{n^4 + 2n + 1} \quad \lim \text{ goes to } \frac{1}{2} \]

   \( \lim \text{ goes to } \frac{1}{2} \)

   \[ \lim_{n \to \infty} \frac{n^3}{n^4} = 0 \to a_n = \frac{n^4}{n^4 + 2n + 1} \quad \text{Conv.} \]

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*Useful limits.*

1. \[ \lim_{n \to \infty} \left( 1 + \frac{b}{n} \right)^n = e^{b} \]

2. \[ \lim_{n \to \infty} \ln \left( \frac{2n+1}{n-2} \right) = \lim_{n \to \infty} \ln \left( \frac{2n+1}{n-2} \right) = \ln \left( \frac{2n+1}{n-2} \right) \]

   \[ \text{limit goes to } \frac{2}{2} \]

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*Note:* The above text includes mathematical expressions and limits. It appears to be a page from a textbook or lecture notes on sequences and series, including examples of finding limits and determining convergence or divergence. The content is presented in a clear, logical manner, using standard mathematical notation. The text is well-organized, with each section clearly marked and explained. The use of diagrams and special symbols such as \( \lim \) and \( \to \) indicates the focus on mathematical concepts and problem-solving techniques. The document is likely part of an educational resource for students learning about sequences, series, and limits in mathematics.