Geometric Sequence

Geometric sequences have the property that each term is obtained by multiplying the previous term by a fixed constant, called the **ratio**.

$$\lim_{n\to\infty} r^n = \begin{cases} \text{\_\_\_\_\_} & |r|<1 \\ \text{\_\_\_\_\_} & r=1 \\ \text{\_\_\_\_\_} & r=-1 \\ \text{\_\_\_\_\_} & |r|>1 \end{cases}$$

The sequence $\{r^n\}$ is **convergent** if $-1 < r \le 1$ and **divergent** for all other values of r.

Definition

- A sequence $\{a_n\}$ is called **increasing** if $a_n < a_{n+1}$ for all $n \ge 1$.
- A sequence $\{a_n\}$ is called **decreasing** if $a_n > a_{n+1}$ for all $n \ge 1$.
- A sequence $\{a_n\}$ is **monotonic** if it is either **increasing** or **decreasing**.

Example:

Show that the sequence $\left\{\dfrac{n}{n^2+1}\right\}$ is decreasing for $n > 1$.