If the sequence converges, then guess the limit, and justify your answer using ~~the~~ only the definition of convergent sequence. Otherwise show – again using the definition only – that the sequence diverges.

1. $\lim\limits_{n\to\infty} \frac{1}{\sqrt{n}}$

2. $\lim\limits_{n\to\infty} \frac{1}{\ln n}$

3. $\lim\limits_{n\to\infty} \left(\frac{1}{\ln n} + 1 \right)$

4. $\lim\limits_{n\to\infty} \frac{1}{(-2)^n}$

5. $\lim\limits_{n\to\infty} a_n$ where $a_n = \begin{cases} 0 & \text{if } n \text{ is even} \\ 2 & \text{if } n \text{ is odd} \end{cases}$

6. $\lim\limits_{n\to\infty} \frac{1}{n^2+1}$