

Let $a_n \rightarrow 0$ and $b_n \rightarrow \text{infinity}$. Set $c_n = a_n b_n$. Give examples where

a. $c_n \rightarrow 0$ b. $c_n \rightarrow \text{infinity}$ c. $c_n \rightarrow 1$ d. c_n oscillates

a.

$$a_n = \frac{1}{n} \quad b_n = \sqrt{n} \quad c_n = \frac{\sqrt{n}}{n} = \frac{1}{\sqrt{n}} \rightarrow 0$$

b.

$$a_n = \frac{1}{\sqrt{n}}, \quad b_n = n, \quad c_n = \frac{n}{\sqrt{n}} = \sqrt{n} \rightarrow \infty$$

c.

$$a_n = \frac{1}{\sqrt{n}}, \quad b_n = \sqrt{n}, \quad c_n = \frac{\sqrt{n}}{\sqrt{n}} = 1 \rightarrow 1$$

d.

$$a_n = \frac{(-1)^n}{\sqrt{n}}, \quad b_n = \sqrt{n}, \quad c_n = \frac{(-1)^n \sqrt{n}}{\sqrt{n}} = (-1)^n$$