Classification of the sequence $a_n = r^n$

1. Sketch a possible plot of the terms (n, a_n) for each representative example shown.
2. Complete the blanks about $\lim\limits_{n \to \infty} r^n$. Write in the blank a number or DNE or ∞ or $-\infty$.
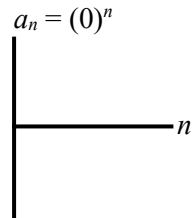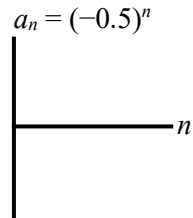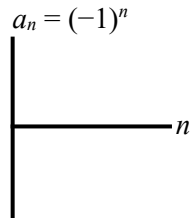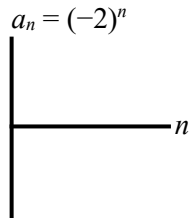3. Decide if $a_n = r^n$ converges (the limit exists) or if $a_n = r^n$ diverges (the limit does not exist or is ∞ or $-\infty$).
4. Plot the values of r on the number line for which $a_n = r^n$ converges.

r

$-1 \qquad 0 \qquad 1$
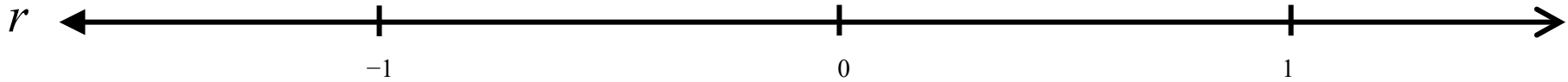
Example: $r = -2 \qquad r = -1 \qquad r = -0.5 \qquad r = 0 \qquad r = 0.5 \qquad r = 1 \qquad r = 2$

| $a_n = (-2)^n$ | $a_n = (-1)^n$ | $a_n = (-0.5)^n$ | $a_n = (0)^n$ | $a_n = (0.5)^n$ | $a_n = (1)^n$ | $a_n = (2)^n$ |
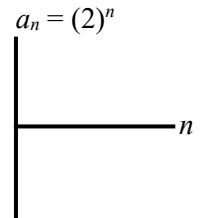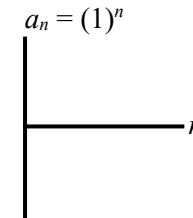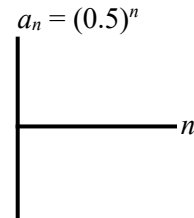
$\lim\limits_{n \to \infty} r^n = \square$ $\lim\limits_{n \to \infty} r^n = \square$ $\lim\limits_{n \to \infty} r^n = \square$ $\lim\limits_{n \to \infty} r^n = \square$ $\lim\limits_{n \to \infty} r^n = \square$ $\lim\limits_{n \to \infty} r^n = \square$ $\lim\limits_{n \to \infty} r^n = \square$

DIVERGES / CONVERGES   DIVERGES / CONVERGES   DIVERGES / CONVERGES   DIVERGES / CONVERGES   DIVERGES / CONVERGES   DIVERGES / CONVERGES   DIVERGES / CONVERGES

Plot the values of r on the number line for which $a_n = r^n$ diverges, i.e., the limit does not exist or is ∞ or $-\infty$. Use the above number line to help you.

r

$-1 \qquad 0 \qquad 1$