

10.1 AP Practice Problems (p.721) - Sequences

1. The general term  $a_n$  for the sequence

$$\left\{ 0, -\frac{1}{2}, \frac{4}{3}, -\frac{9}{4}, \frac{16}{5}, \dots \right\}$$
 is

(A)  $\frac{(n-1)^2}{n}$

(B)  $(-1)^n \frac{(n-1)^2}{n}$

(C)  $(-1)^{n+1} \frac{(n-1)^2}{n}$

(D)  $(-1)^n \frac{n^2}{n+1}$

2. Which sequence is defined by  $\{b_n\} = \left\{ \left(-\frac{2}{3}\right)^n (n-3) \right\}$ ?

(A)  $\frac{4}{3}, -\frac{4}{9}, \frac{16}{81}, -\frac{64}{243}, \dots$

(B)  $\frac{4}{3}, -\frac{4}{9}, 0, \frac{16}{81}, -\frac{64}{243}, \dots$

(C)  $-\frac{2}{3}, \frac{4}{9}, 0, \frac{16}{81}, -\frac{32}{243}, \dots$

(D)  $-\frac{2}{3}, \frac{4}{9}, -\frac{8}{27}, \frac{16}{81}, -\frac{32}{243}, \dots$

$$b_1 = \left\{ \left(-\frac{2}{3}\right)^1 (1-3) \right\}$$

$$b_1 = \left\{ \left(-\frac{2}{3}\right)(-2) = \frac{4}{3} \right\}$$

$$b_2 = \frac{4}{3}$$

$$b_2 = -\frac{4}{9}$$

$$b_3 = 0$$

3. The sequence  $\{a_n\} = \left\{ \frac{2}{3n+1} \right\}$  can be described as

(A) increasing and bounded.

(B) decreasing and bounded.

(C) increasing and not bounded.

(D) decreasing and not bounded.

$$0 < a_n \leq \frac{1}{2}$$

4. For what values of  $x$  does the sequence  $\{3x^n\}$  converge?

- (A)  $-1 < x \leq 1$     (B)  $-1 < x < 1$   
(C)  $-3 < x < 3$     (D) The sequence diverges.

$$|x| < 1 \quad -1 < x < 1$$

$$r = |x|$$

$$|x| < 1$$

5. Determine whether the sequence  $\left\{ \frac{\sin n}{n^3} \right\}$  converges or diverges. Justify your answer.

$$\lim_{n \rightarrow \infty} \left[ -\frac{1}{n^3} \leq \frac{\sin(n)}{n^3} \leq \frac{1}{n^3} \right]$$

$$0 \leq \frac{\sin(n)}{n^3} \leq 0$$

Sequence converges to 0  
by Squeeze theorem