

**201-203-RE - Practice Set #18: Sequences**

Determine whether the following sequences converge or diverge. If a sequence converges, find its limit.

(1)  $\left\{ \frac{\sqrt{9n^2 + 2}}{2n + 5} \right\}$

(4)  $\left\{ 4 \cdot \left( \frac{1}{3} \right)^{n-1} \right\}$

(7)  $\left\{ \frac{(-2)^n}{(-3)^{n-1}} \right\}$

(2)  $\left\{ \frac{4(n-1)!}{3n!} \right\}$

(5)  $\left\{ \frac{4n+5}{2^{n-1}} \right\}$

(8)  $\left\{ \frac{5+n}{\sqrt{3+4n^2}} \right\}$

(3)  $\left\{ \frac{1}{2} \cdot 5^{n+1} \right\}_{n=2}^{\infty}$

(6)  $\left\{ (-1)^n \frac{(n+1)!}{n \cdot n!} \right\}$

(9)  $\left\{ \left( \frac{-4}{3} \right)^{n-2} \right\}$

Find a formula for the  $n^{\text{th}}$  term of the following sequences.

(10)  $\{5, 7, 9, 11, \dots\}$

(12)  $\left\{ 0, \frac{3}{4}, \frac{8}{6}, \frac{15}{8}, \dots \right\}$

(14)  $\left\{ 5, 25, \frac{125}{2}, \frac{625}{6}, \frac{3125}{24}, \dots \right\}$

(11)  $\left\{ 3, \frac{3}{2}, \frac{3}{4}, \frac{3}{8}, \dots \right\}$

(13)  $\left\{ \frac{-1}{2}, \frac{2}{9}, \frac{5}{28}, \frac{8}{65}, \dots \right\}$

(15)  $\left\{ \frac{6}{16}, \frac{13}{64}, \frac{22}{256}, \frac{33}{1024}, \dots \right\}$

**ANSWERS:**

(1)  $3/2$

(7)  $0$

(12)  $a_n = \frac{n^2 - 1}{2n}$

(2)  $0$

(8)  $1/2$

(13)  $a_n = \frac{3n - 4}{n^3 + 1}$

(3) Diverges

(9) Diverges

(4)  $0$

(10)  $a_n = 2n + 3$

(14)  $a_n = \frac{5^n}{(n-1)!}$

(5)  $0$

(11)  $a_n = \frac{3}{2^{n-1}}$

(15)  $a_n = \frac{(n+2)^2 - 3}{4^{n+1}}$

(6) Diverges