

Determine the limit of the sequence or state that the sequence diverges.

1. $a_n = 4$

2. $a_n = 5 - \frac{9}{n^2}$

3. $c_n = -2^{-n}$

4. $z_n = \left(\frac{1}{3}\right)^n$

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

6. $a_n = \frac{n}{\sqrt{n^3 + 1}}$

Determine the limit of the sequence or state that the sequence diverges.

7. $a_n = \cos(\pi n)$

8. $a_n = \frac{2n^2 - 4n + 5}{3n^2 + 2}$

Determine if the sequence is increasing, decreasing, or not monotonic. Is the sequence bounded?

9. $a_n = \frac{1}{2n+1}$

10. $a_n = \frac{3n^2}{n^2 + 2}$

Answers:

1. 4

2. 5

3. 0

4. 0

5. Diverges

6. 0

7. Diverges

8. $\frac{2}{3}$

9. $\left[0, \frac{1}{3}\right]$

10. $[1, 3]$