

LIMITS OF SEQUENCES

Find the following limits.

1. $\lim_{n \rightarrow \infty} \frac{2n^2 + n - 3}{n^3 + 1}$
2. $\lim_{n \rightarrow \infty} \frac{2n^5 + 3n - 2}{n^5 - 3n^3 + 1}$
3. $\lim_{n \rightarrow \infty} \frac{2n^3 + 6n}{n^3 - 7n + 7}$
4. $\lim_{n \rightarrow \infty} \left(\frac{1 + 2 + \cdots + n}{n + 2} - \frac{n}{2} \right)$
5. $\lim_{n \rightarrow \infty} \frac{1^2 + 2^2 + \cdots + n^2}{n^3}$
6. $\lim_{n \rightarrow \infty} \frac{1^3 + 2^3 + \cdots + n^3}{n^4}$
7. $\lim_{n \rightarrow \infty} \frac{(n+4)^{100} - (n+3)^{100}}{(n+2)^{100} - n^{100}}$
8. $\lim_{n \rightarrow \infty} \frac{n}{2^n}$
9. $\lim_{n \rightarrow \infty} \sqrt[n]{2^n + 4^n}$
10. $\lim_{n \rightarrow \infty} \frac{2^n}{n!}$
11. $\lim_{n \rightarrow \infty} \frac{3^n + n^5}{n^6 + n!}$
12. $\lim_{n \rightarrow \infty} \frac{\sqrt[n]{a^n + b^n}}{\sqrt[n]{a^{2n} + b^{2n}}}, a > b > 0$
13. $\lim_{n \rightarrow \infty} (\sqrt{n+1} - \sqrt{n})$
14. $\lim_{n \rightarrow \infty} (\sqrt[3]{n+1} - \sqrt[3]{n})$
15. $\lim_{n \rightarrow \infty} \frac{\sqrt[3]{n^2 + 7} - \sqrt[3]{n^2 + 1}}{\sqrt[3]{n^2 + 6} - \sqrt[3]{n^2}}$
16. $\lim_{n \rightarrow \infty} \frac{\sqrt[3]{n^3 + n} - \sqrt[3]{n^3 + 1}}{\sqrt[3]{n^3 + 2n} - \sqrt[3]{n^3 + n}}$
17. $\lim_{n \rightarrow \infty} \frac{\sqrt[4]{n+2} - \sqrt[4]{n+1}}{\sqrt[3]{n+3} - \sqrt[3]{n}}$
18. $\lim_{n \rightarrow \infty} (-1)^n \sqrt{n} (\sqrt{n+1} - \sqrt{n})$

SOLUTIONS

1. 0 2. 2 3. 2 4. $-1/2$ 5. $1/3$ 6. $1/4$ 7. $1/2$ 8. 0 9. 4 10. 0 11. 0
 12. $1/a$ 13. 0 14. 0 15. 1 16. 1 17. 0 18. Limit does not exist.