

3.) Compute the first five terms (starting with $n=0$) of each sequence. Determine whether each sequence converges or diverges.

- a.) $a_n = 3$ b.) $a_n = 3^n$ c.) $a_n = \frac{3}{n}$ d.) $a_n = \left(\frac{1}{3}\right)^n$ e.) $a_n = 3^{1/n}$
f.) $a_n = \frac{n+5}{n+2}$ g.) $a_n = n(3-n)$ h.) $a_n = \frac{n^3 + n^2 - n + 7}{4n^3 + 5n^2 - 2}$ i.) $a_n = (0.9999)^n$
j.) $a_n = (1.00001)^n$ k.) $a_n = \left(\frac{-2}{3}\right)^n$ l.) $14/3, 15/5, 16/7, 17/9, \dots$
m.) $a_n = \sin n\pi$ n.) $a_n = \left(\frac{\sqrt{7}}{\ln 14}\right)^n$ o.) $a_n = \cos(2n\pi)$ p.) $a_n = (1 + 1/n)^3$
q.) $a_n = n(n-1)(n-2)(n-3)(n-4)$ r.) $a_n = \sin(\pi/2 + n\pi)$
s.) $a_n = 3 + (-1)^n$

4.) Find a formula a_n , where $n = 0, 1, 2, 3, 4, \dots$, for each of the following sequences.

- a.) $1, 3, 5, 7, 9, \dots$ b.) $2, 4, 6, 8, 10, \dots$ c.) $1, 4, 9, 16, 25, \dots$
d.) $3, 7, 11, 15, 19, \dots$ e.) $12, 36, 108, 324, 972, \dots$ f.) $1, -1, 1, -1, 1, \dots$
g.) $4, 8, 4, 8, 4, \dots$ h.) $0, 0, 2, 6, 12, 20, 30, \dots$
i.) $4/3, 7/7, 10/11, 13/15, 16/19, 19, 23, \dots$ j.) $-1/9, 1/3, -1, 3, -9, 27, -81, \dots$
(FACT : $1 + 2 + 3 + \dots + n = (1/2)n(n+1)$)
k.) $1, 3, 6, 10, 15, 21, 28, \dots$ l.) $4, 8, 13, 19, 26, 34, 43, \dots$

5.) Determine how many number are in each finite list.

- a.) $2, 4, 6, 8, 10, \dots, 9864$ b.) $55, 57, 59, 61, 63, \dots, 637$
c.) $3^7, 3^{11}, 3^{15}, 3^{19}, \dots, 3^{203}$ d.) $3, 6, 10, 15, 21, \dots, 1891$

e.) 1, 2, 4, 7, 8, 10, 13, 14, 16, 19, 20, 22, ..., 601, 602, 604

6.) Find the 15th number in the following sequence : 1, 1, 2, 3, 5, 8, 13, 21, 34, ...

7.) Find the 200th number in the following sequence : 3, 7, 11, 15, 19, 23, ...

8.) A super ball bearing is dropped from a building 1000 feet high. Each time the ball bearing rebounds to 75% of its falling distance. How high does the ball bounce on its 20th rebound ?

10.) Determine the limit of the following sequence :

$$2, \quad 2 - \frac{1}{2}, \quad 2 - \frac{1}{2 - \frac{1}{2}}, \quad 2 - \frac{1}{2 - \frac{1}{2 - \frac{1}{2}}}, \quad 2 - \frac{1}{2 - \frac{1}{2 - \frac{1}{2 - \frac{1}{2}}}} \quad \dots$$

11.) Use algebra to evaluate the following limits.

a.) $\lim_{x \rightarrow 2} \frac{x^2 + 3x}{x^2 - 16}$

b.) $\lim_{x \rightarrow 1} \frac{x^2 - 1}{x^2 + x - 2}$

c.) $\lim_{x \rightarrow 4} \frac{x - 4}{\sqrt{x} - 2}$

d.) $\lim_{x \rightarrow -1} \frac{\frac{1}{x} + 1}{x + 1}$

e.) $\lim_{x \rightarrow 2} \cos \frac{\pi}{3}x$

f.) $\lim_{x \rightarrow -1} \sin \frac{\pi}{4}x$

g.) $\lim_{x \rightarrow 0} \frac{\sqrt{x^2 + 16} - 4}{x^2}$

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The following problem is for recreational purposes only.

12.) Plant 10 trees in 5 straight rows of four trees each.