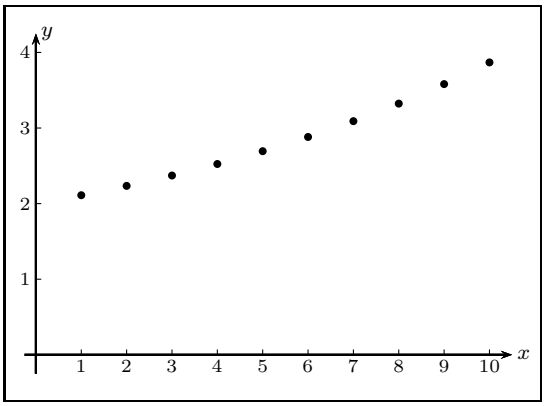
Calculate, to four decimal places, the first ten terms of the sequence and use them to plot the graph of the sequence by hand. Does the sequence appear to have a limit? If so, calculate it. If not, explain why.[1]

$$a_n = 1 + \frac{10^n}{9^n}$$

The calculated values are shown in the table at left, and are graphed on the right.

n	a_n
1	2.1111
2	2.2346
3	2.3717
4	2.5242
5	2.6935
6	2.8817
7	3.0908
8	3.3231
9	3.5812
10	3.8680



From the graph, it appears that the sequence does not have a limit.

We can write

$$\lim_{n\to\infty}\left(1 + \frac{10^n}{9^n}\right)$$
$$= \lim_{n\to\infty} 1 + \lim_{n\to\infty}\left(\frac{10}{9}\right)^n$$

We know the sequence $\{a_n\}$ is convergent for $-1 < r \leq 1$ and divergent for all other values of r. Since $\frac{10}{9} > 1$, the sequence $a_n = 1 + \frac{10^n}{9^n}$ is divergent.

[1] Stewart, *Calculus, Early Transcendentals*, p. 704, #22.