Precalc 12.3

Find the limit of the terms of an infinite sequence
Find the sum of an infinite geometric series
Use limits to write the fraction form of a repeating decimal

x rule $0 < r < 1$

geometric sequence

$-1 < r < 0$

common ratio r

geometric series

infinite sequence

Lesson 12-3 *(Pages 774–783)*

Find each limit, or state that the limit does not exist

1. $\lim_{n\to\infty} \frac{4 + 2n}{3n}$

2. $\lim_{n\to\infty} \frac{n^4 - 3n}{n^3}$

4. $\lim_{n\to\infty} \frac{4n^2 - 2n + 1}{n^2 + 2}$

5. $\lim_{n\to\infty} \frac{n^3 - n^2 + 4}{5 + 2n^3}$

3. $\lim_{n\to\infty} \frac{8n^2 + 6n - 2}{4n^2}$

6. $\lim_{n\to\infty} \frac{2^n n}{2 + n}$ $= \dfrac{\frac{2^n}{n} \cdot \frac{n}{n}}{\frac{2}{n} + \frac{n}{n}}$

$= \dfrac{\frac{2^n}{n} \cdot 1}{\frac{2}{n} + 1} = \frac{0}{1} = 0$

Sum of an Infinite Geometric Series	The sum S of an infinite geometric series for which $\lvert r \rvert < 1$ is given by $S = \frac{a_1}{1 - r}$.

Write 0.333....(repeating) as a fraction

$0.\overline{3} = 0.3 + 0.03 + 0.003 + .0003 + 0.00003 \ldots$

1st term 0.3

Rule? $r = \frac{1}{10}$

Infinite series

0.757575...

$S = \frac{a_1}{1-r} = \frac{0.3}{1-0.1} = \frac{0.3}{0.9} = \frac{3}{9} = \frac{1}{3}$

$0.75 + .0075 + 0.000075 \ldots$

$a_1 = 0.75 \quad r = \frac{1}{100} = 0.01$

$S_n = \frac{0.75}{1-0.01} = \frac{0.75}{.99} = \frac{75}{99} = \frac{25}{33}$

0.9999999...

$a_1 = 0.9 \quad r = \frac{1}{10} = 0.1 \quad \frac{0.9}{1-0.1} = \frac{0.9}{0.9} = 1$

$3 \cdot 0.\overline{3} = \frac{1}{3} \cdot 3$

$0.\overline{9} = \frac{3}{3}$

First term? r?

6 **Write $0.\overline{762}$ as a fraction.**

$a_1 = 0.762$

$r = 0.001$

$$\frac{762}{999} = \frac{254}{333}$$