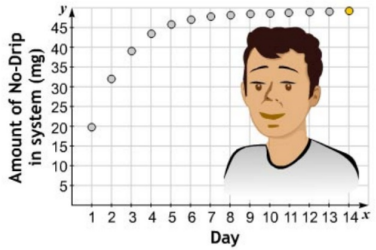

What is the graph doing as the number of days increases?

It continues to increase but slows down and begins to level out.

Agile Mind Website: Topic 1 - Exploring - Infinite pg6

What must be true about successive terms for the graph of partial sums to start approaching a limiting value?

Successive terms must start to become smaller and smaller, thus affecting the total less and less.

Agile Mind Website: Topic 1 - Exploring - Infinite pg7

Agile Mind Website: Topic 1 - Exploring - Infinite pg8

Agile Mind Website: Topic 1 - Exploring - Infinite pg9

- Convergent Series
- Divergent Series

Agile Mind Website: Topic 1 - Exploring - Infinite pg10

Agile Mind Website: Topic 1 - Exploring - Infinite pg11

Which are the only types of Infinite Series that will CONVERGE?

Geometric, if...

$|r| < 1$ → Another way to think if this is that r must be between -1 and 1 but not zero.

Formula:
Sum of a FINITE Geometric Series

$$S_n = t_1\left(\frac{1-r^n}{1-r}\right)$$

Formula:
Sum of an INFINITE Geometric Series

$|r| < 1$

r is between -1 and 1 but not zero

$$S = t_1\left(\frac{1-r^\infty}{1-r}\right)$$

Since $|r|<1$, r^∞ approaches zero.

The formula becomes:

$$S = t_1\left(\frac{1-0}{1-r}\right)$$

$$S = t_1\left(\frac{1}{1-r}\right) = \frac{t_1}{1-r}$$

Find this sum, if it exists.

1. $11 + 4 + -3 + -10 + \ldots$ Infinite series

$-7 \quad -7 \quad -7$

Arithmetic $d = -7$

Since this is an Infinite Arithmetic series it has NO SUM.

Find this sum, if it exists.

2. $8 + 16 + 32 + 64 + 128 + \ldots$ infinite series

$\times 2 \quad \times 2 \quad \times 2$

Geometric $r = 2$

Since this is an Infinite Geometric series and $|r|>1$, this series has NO SUM

Find this sum, if it exists.

3. $7 + 10 + 13 + 16 + \ldots + 34$

$+3 \quad +3 \quad +3$

Since this is a FINITE series, it must have a sum.

Arithmetic with d=3

must find n (# terms) using explicit formula

$t_n = t_1 + d(n-1)$

$34 = 7 + 3(n-1)$

$-7 \quad -7$

$\frac{27}{3} = \frac{3(n-1)}{3}$

$9 = n-1$

$+1 \quad +1$

$n = 10$

Sum of Finite Arithmetic Series:

$S_n = \frac{n}{2}(t_1 + t_n)$

$t_1 = 7$

$t_n = 34$

$S_{10} = \frac{10}{2}(7+34)$

$= 5(41)$

$S_{10} = 205$

Find this sum, if it exists.

4. $1250 + 250 + 50 + 10 + \ldots$ infinite Series

$\times \frac{1}{5} \quad \times \frac{1}{5}$

Geometric $r = \frac{1}{5} = 0.2$

Since this is an Infinite Geometric series with $|r|<1$, this series has a sum:

$S = \frac{t_1}{1-r} = \frac{1250}{1-.2}$

$= \frac{1250}{.8}$

$S = 1562.5$

Find this sum, if it exists.

5. $\sum_{n=1}^{\infty} 24 - 3(n-1)$

Infinite series

Arithmetic

Since this is an Infinite Arithmetic Series, there is NO SUM.

Find this sum, if it exists.

6. $\sum_{n=1}^{\infty} 8(-0.2)^{n-1}$

Infinite series

Geometric series

common ratio = -0.2

Since this is an Infinite Geometric Series with |r|<1, this series has a sum:

$S = \frac{t_1}{1-r}$ $\quad t_1 = 8$, $r = -0.2$

$= \frac{8}{1--.2} = \frac{8}{1.2}$

$S = 6.\overline{6} = 6\frac{2}{3}$

Find this sum, if it exists.

7. $\sum_{n=1}^{\infty} 18(1.01)^{n-1}$

common ratio = 1.01

Infinite Series

Geometric

This series has NO SUM because even though it is an Infinite Geometric series |r| is not less than 1.

Hwk #7:

Practice Problems - Infinite Series

and

More Practice pages 9-13,

Agile Mind website - Topic 1: Arith & Geo Seq & Series

Due: Tomorrow 9/18

Test over Topic 1 - Thursday:

Part 1: Paper/Pencil - Use the review I gave you

Part 2: Online problems - Review using More Practice and Extra Practice on website.