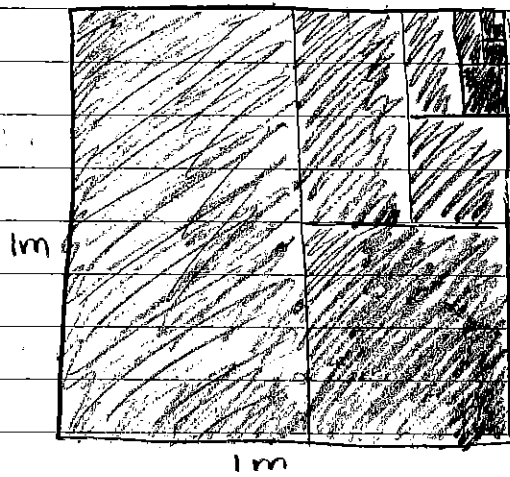


1.5 Infinite Geometric Series

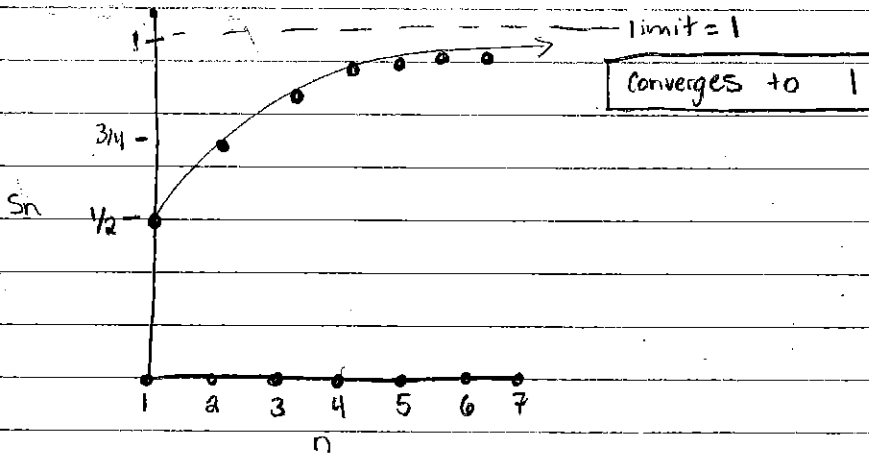


Infinite # of terms

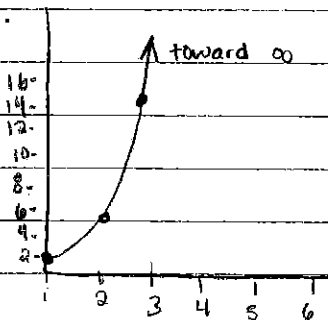
$$\frac{1}{2} + \frac{1}{4} + \frac{1}{8} + \frac{1}{16} + \frac{1}{32} + \frac{1}{64} + \frac{1}{128} + \frac{1}{256} + \frac{1}{512} + \frac{1}{1024} + \dots = 1 \text{ m}^2$$

limit to which the sum converges

on a graph



Divergent sum: $2 + 4 + 16 + \dots = \infty$ no limit (does not converge to a number)



A series is convergent if $-1 < r < 1$

A series is divergent if $r < -1$ or $r > 1$

Formula for infinite series:

$$S_{\infty} = \frac{t_1}{1-r}$$

if $-1 < r < 1$
convergent

Ex. 1 State if each series is convergent or divergent. If convergent, find the infinite sum.

a) $4 + 6 + 9 + \dots$

① Find r :

$$6/4 = 3/2 = 1.5$$

∴ Divergent; no infinite sum

b) $125 + 25 + 5 + \dots$

① Find r :

$$5/25 = 1/5 = 0.2$$

convergent

$$S_{\infty} = \frac{125}{1 - 1/5}$$

$$S_{\infty} = \frac{125}{4/5}$$

$$S_{\infty} = \frac{125 \times 5}{4}$$

$$S_{\infty} = 625/4 = \boxed{156.25}$$

c) $1 - 1/3 + 1/9 - 1/27 + \dots$

$$1/9 \div -1/3 = 1/9 \times 3 = 3/9 = 1/3$$

$r = 1/3 \rightarrow$ convergent

$$S_{\infty} = \frac{1}{1 - (-1/3)}$$

$$S_{\infty} = 1/4/3$$

$$S_{\infty} = \frac{1}{4} \times \frac{3}{1}$$

$$S_{\infty} = \frac{3}{4} = \boxed{0.75}$$

Homework:

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