Sum of a Partial Geom Series: $S_n = \frac{a(1-r^n)}{1-r}$

Find the sum of the first 5 terms. Then find r.

r: common ratio

42) 8, 12, 18, 27, 81/2

$r = 1.5$

$8+12+18+27+\frac{81}{2} = 105.5$

S_∞ = Diverges

Find the sum of the first 10 terms. Then find r.

41) $8, -4, 2, -1, \frac{1}{2}, \frac{-1}{4}, \frac{1}{8}, \frac{-1}{16}, \frac{1}{32}, \frac{-1}{64}$

$S_{10} = \frac{8\left(1+\left(-\frac{1}{2}\right)^{10}\right)}{1+\left(-\frac{1}{2}\right)}$

$8+(-4)+(2)+(-1)+\left(\frac{1}{2}\right)+\left(-\frac{1}{4}\right)+\frac{1}{8}+\left(\frac{-1}{16}\right)+\frac{1}{32}+\left(\frac{-1}{64}\right)$

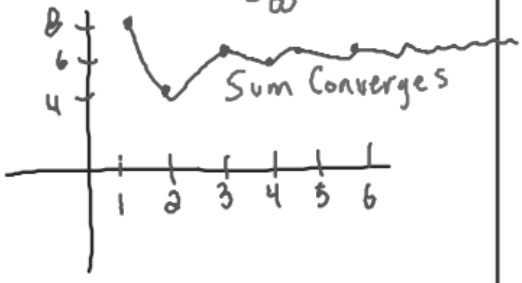
$r = -\frac{1}{2}$

$S_1 = 8$ $S_5 = 5.5$ $S_9 = 5.34375$

$S_2 = 4$ $S_6 = 5.25$ $S_{10} = 5.328125$

$S_3 = 6$ $S_7 = 5.375$ $S_\infty = 5.\overline{3}$

$S_4 = 5$ $S_8 = 5.3125$



41A) $8, 4, 2, 1, \frac{1}{2}, \frac{1}{4}, \frac{1}{8}, \frac{1}{16}, \frac{1}{32}, \frac{1}{64}$

$8+4+2+1+\frac{1}{2}+\frac{1}{4}+\frac{1}{8}+\frac{1}{16}+\frac{1}{32}+\frac{1}{64}+\cdots$

$S_1 = 8$ $S_6 = 15.75$ $S_\infty = 15.999 \approx 16$

$S_2 = 12$ $S_7 = 15.875$

$S_3 = 14$ $S_8 = 15.9375$ Converges

$S_4 = 15$ $S_9 = 15.96875$

$S_5 = 15.5$ $S_{10} = 15.984375$

Infinite Geo Series

$S = \frac{a}{1-r}$

$-1 < r < 1$

$a_n = a_1(r)^{n-1}$

Find the sum of the infinite series using the formula $S = \frac{a}{1-r}$.

41) $8, -4, 2, -1, \frac{1}{2}, \frac{-1}{4}, \frac{1}{8}, \frac{-1}{16}, \frac{1}{32}, \frac{-1}{64}$

$S_\infty = \frac{8}{1-(-\frac{1}{2})} = \frac{8}{(\frac{3}{2})} = \frac{16}{3}$

41A) $8, 4, 2, 1, \frac{1}{2}, \frac{1}{4}, \frac{1}{8}, \frac{1}{16}, \frac{1}{32}, \frac{1}{64}$

$S_\infty = \frac{8}{1-\frac{1}{2}} = \frac{8}{(\frac{1}{2})} = 16$

62. $\sum_{n=0}^{\infty} 2\left(\frac{-2}{3}\right)^n$

$\underset{n=0}{2}, \underset{n=1}{-4/3}, \underset{n=2}{8/9}, \underset{}{-16/27}, \ldots$

$S = \frac{2}{1-(-\frac{2}{3})} = \frac{2}{(\frac{5}{3})} = \frac{6}{5}$

64. $\sum_{n=1}^{\infty} \frac{1}{2}(4^n)$

$r = 4$

Diverges

r is not between −1 and 1

64B. $\sum_{n=1}^{\infty} \frac{1}{2}(-4)^n$

Diverges

$r = -4$

64C. $\sum_{n=1}^{\infty} \frac{-1}{2}\left(\frac{1}{4}\right)^n$

$S = \frac{-\frac{1}{8}}{1-\frac{1}{4}}$

70) $9 + 6 + 4 + 8/3 + \ldots$

$S = \frac{9}{1-\frac{2}{3}} = \frac{9}{(\frac{1}{3})} = 27$

Use summation Notation to write the sum

A) $2 + 4 + 8 + \cdots + 512$

$n=1$ $\quad n=$

$\sum_{n=1}^{9} 2(2)^{n-1}$ $\qquad 2(2)^{n-1} = 512$

B) $5 - 15 + 45 - \cdots + 32805$

$\sum_{n=1}^{9} 5(-3)^{n-1}$

C) $1000 + 500 + 250 + \cdots 125/64$

$\sum_{n=1}^{10} 1000\left(\frac{1}{2}\right)^{n-1}$

Find the finite sum

46. $\sum_{n=1}^{9}(-2)^{n-1}$

52. $\sum_{n=1}^{10} 5\left(-\frac{1}{3}\right)^{n-1}$