C11 - 1.6 - Sigma Notation - Notes

Find the sum of the terms

Arithmetic

Steps
Put in $k =$ bottom number the equation
Put in $k+1$ (bottom # plus 1)
Repeat until $k =$ top number

$\sum_{k=1}^{4} 2k = ?$ ↑ d

k=1	k=2	k=3	k=4
2	4	6	8

$2k = 2(1) = 2$ $\quad 2k = 2(2) = 4$ $\quad 2k = 2(3) = 6$ $\quad 2k = 2(4) = 8$

k	$2k$
1	2
2	4
3	6
4	8

$s_4 = 2 + 4 + 6 + 8 = 20$

Arithmetic

$\sum_{k=1}^{100} 2k = ?$

$s_n = \frac{n}{2}(2t_1 + (n-1)d)$

$s_{100} = \frac{100}{2}(2(2) + (100-1)2)$

$s_{100} = 10100$

$s_n = \frac{n}{2}(2t_1 + (n-1)d)$

$\#\ of\ terms = n - k + 1$
= Top # minus Bottom # + 1

$d = 4 - 2$
$d = 2$

$d = 6 - 4$
$d = 2$

$n = 100 - 1 + 1$
$n = 100$

Geometric

$\sum_{k=2}^{6} 8(\frac{1}{2})^{k-1} = ?$

↑ Always r

↑ Not Always t1

k=2	k=3	k=4	k=5	k=6
4	2	1	$\frac{1}{2}$	$\frac{1}{4}$

$4 + 2 + 1 + \frac{1}{2} + \frac{1}{4} = 7.75$

$n = 6 - 2 + 1$
$n = 5$

$3(\frac{1}{2})^{k-1} = 8\left(\frac{1}{2}\right)^{2-1} = 4$

$3(\frac{1}{2})^{k-1} = 8\left(\frac{1}{2}\right)^{3-1} = 2$

$\cdots$

$3(\frac{1}{2})^{k-1} = 8\left(\frac{1}{2}\right)^{6-1} = \frac{1}{4}$

$s_n = \frac{t_1(1 - r^n)}{1 - r}$

$s_n = \frac{t_1(1 - r^n)}{1 - r}$

$s_5 = \frac{4\left(1 - \left(\frac{1}{2}\right)^5\right)}{1 - \left(\frac{1}{2}\right)}$

$s_5 = 7.75$

Infinite Geometric

$\sum_{k=2}^{\infty} 3(2)^{k-1} = ?$

4, 2, 1, $\frac{1}{2}$, $\frac{1}{4}$ ...

$r = \frac{2}{4}$
$r = \frac{1}{2}$

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

$-1 < r < 1$
$-1 < \frac{1}{2} < 1$
$\therefore$ Convergent, has sum

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

$s_\infty = \frac{4}{1 - \left(\frac{1}{2}\right)}$

$s_\infty = \frac{4}{\frac{1}{2}}$

$s_\infty = 4 \times \frac{2}{1}$

$s_\infty = 8$