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Series Handout #5

Topic	Interpretation
Arithmetic Sequence(*Progression*) a,a+d,a+2d,a+3d,……,a+(n-1)d **n^{th} term : $a_n = a + (n-1)d$** **Sum of first n terms**: $S_n = \frac{n}{2}(a + a_n)$ $= \frac{n}{2}\{\ 2a + (n-1)d\ \}$ Example 3: Find the sum of the first n odd positive integers: 1+3+5+7+……..+ **Geometric Sequence(*Progression*)** a,ar,ar^2,ar^3,……..,ar^{n-1} **n^{th} term :$a_n = ar^{n-1}$** **Sum of first n terms**: $S_n = a \times \frac{r^n - 1}{r - 1}$ **Sum to infinity of a G.P.** A geometric sequence is said to be infinite when **-1 < r < 1** In this case **:** $S_\infty = \frac{a}{1 - r}$ Example 6: Find the sum to infinity of : $1+(1/2)+(1/2)^2+(1/2)^3$ + ……..	Example1: Fourth term = a+3d 15^{th} term = a + 14d 100^{th} term = a + 99d Example2: For the progression: 3,7,11,15,…… Find the 50^{th} term. a = 3 ; d = 7 – 3 = 4 a_{50} = a + 49d = 3 + 49(4) = 199 Find the sum of the first 20 terms of the above sequence : S_{20} = (20/2)[2(3) + (20-1)(3)] = (10)[6+57] = 630 It is an A.P. of first term a=1 and common difference d = 2 S = (n/2)[2(1) + (n-1)(2)] = (n/2)[2n] = n^2 Example 4: 7^{th} term = ar^6 40^{th} term = ar^{39} Example 5: For the sequence 3,6,12,…….. Find the 10^{th} term. a = 3 , r = 6/3 = 2 a_{10} = ar^9 = $3(2)^9$ Find the sum of the first 15 terms: $S_n = a \times \frac{r^n - 1}{r - 1}$; $S_{15} = 3 \times \frac{2^{15} - 1}{2 - 1}$ S_{15} =$3(2^{15} - 1)$ ⇨ a = 1 , r = ½ < 1 S = a/(1-r) = 1/(1-1/2) = 2