Lesson 28 – Arithmetic & Geometric Series

(A) Lesson Objectives

a. Introduce the concept of & a formula for an arithmetic series
b. Introduce the concept of & a formula for a geometric series

(B) Review of Key Ideas

a. Arithmetic Sequence

b. Geometric Sequence

c. Series

(C) Examples – Working with Arithmetic Series

a. Ex 1. Find the sum of the series13 + 24 + 35 + … + 156
b. Ex 2. For the series 2 + 11 + 20 + 29 + ..., find u_{20} and S_{20}
c. Ex 3. The fifth term of an arithmetic series is 9 and the sum of the first 16 is 480. Find the first three terms of the series.
d. Ex 4. In an arithmetic series of 50 terms, the 17th term is 53 and the 28th term is 86. Find the sum of the series.
e. ex 5. Shayla deposits $128 into her account. Each week she deposits $7 less than the previous week until she deposits her last deposit of $2. What total amount did she deposit?
f. ex 6. Jayne buys 10 widgets on the Jan 1st, 15 on the 1st of Feb, 20 on the 1st of March, etc..... How many widgets has she acquired in 2 years? How long does it take her to acquire 5,000 widgets?

(D) Examples – Working with Geometric Series

a. ex 1. Find S_8 : (a) 2 - 6 + 18 - 54 + ... (b) 200 + 100 + 50 + 25 + ...
b. ex 2. Find the total amount you make if you were paid a rupee a day, but the amount was doubled every day for a month
c. ex 3. Find the sum 1/16 + 1/4 + 1 + 4 + ... + 65536
d. Ex 4. The fifth term of a geometric series is 405 and the sixth term is 1215. Find the sum of the first nine terms.
e. ex 5. A ball drops from a height of 16 m and its height on the bounce is 5/8th of the previous maximum height. Determine the total height bounced by the ball after it touches the ground for the 7th bounce.

(E) Examples – Working with Infinite Geometric Series

a. Given the series S = 200 + 100 + 50 + 25 …
   i. Determine S_6
   ii. Determine S_{15}
   iii. Determine S_{21}
   iv. Predict $S_{1,000,000}$

b. The series ½ + ¼ + 1/8 + 1/16 + ... is an example of an infinite geometric series.
   i. Determine the sum of this series.
   ii. Is it possible to find the sum of *any infinite geometric sequence? Explain.*
   iii. Under what conditions is it possible to find the sum of an infinite geometric sequence

(F) Extra Help – Links

a. Geometric Sequences & Series From West Texas A&M
b. Arithmetic Sequences & Series From West Texas A&M U

(G) Homework

- Ex 2E.1 #1ae;
- Ex 2E.2 #1c, 2a, 3,5, 6, 11;
- Ex 2E.3 #1bc, 2cd, 4, 6, 7
- HW Ex 2F #1c, 3c, 4c, 5ab