

# Sequences and Series

## I. Sequences

\* Sequence - A set of numbers written in a given order.

Examples: Finite vs. Infinite?

- ① 1, 2, 3, 4, 5, 6    F
- ② 1, 2, 3, 4, 5, 6, ...    I
- ③ 2, 4, 6, 8    F

Terms of a Sequence:  $a_1, a_2, a_3, a_4, \dots, a_n$

\* Recursive Formula - A formula based on the previous term \* of the sequence.

- Examples:
- Ⓐ Identify the pattern
  - Ⓑ Write the next 3 terms of the seq.
  - Ⓒ Write a recursive formula
  - Ⓓ Arithmetic Sequence or Geometric Sequence (After)

- ① 6, 18, 30, 42
- $\begin{matrix} +12 \\ a_7 & a_8 \\ & a_n \end{matrix}$
- Ⓐ Add 12
  - Ⓑ 54, 66, 78
  - Ⓒ  $a_n = a_{n-1} + 12$
  - Ⓓ Arith.

- ② 8, 16, 32, 64
- Ⓐ Mult by 2
  - Ⓑ 128, 256, 512
  - Ⓒ  $a_n = (a_{n-1}) \cdot 2$
  - Ⓓ Geom.

- ③  $\frac{2}{3}, \frac{7}{6}, \frac{5}{3}, \frac{13}{6}, \frac{8}{3}$
- $\frac{4}{6}, \frac{7}{6}, \frac{10}{6}, \frac{13}{6}, \frac{16}{6}$
- Ⓐ Add  $\frac{1}{2}$
  - Ⓑ  $-\frac{1}{6}, \frac{1}{3}, \frac{2}{6}$
  - Ⓒ  $a_n = a_{n-1} + \frac{1}{2}$
  - Ⓓ Arith.

- ④ 250, 50, 10, 2
- Ⓐ Mult by  $\frac{1}{5}$
  - Ⓑ  $\frac{2}{5}, \frac{2}{25}, \frac{2}{125}$
  - Ⓒ  $a_n = (a_{n-1}) \cdot \frac{1}{5}$
  - Ⓓ Geom.

Arithmetic Sequence - When there is a common difference, "d", between 2 terms. (Add "d")

$\begin{matrix} +d & +d \\ 3, 5, 7, 9 \end{matrix}$ 
Recursive Formula  
 $a_n = a_{n-1} + d$

Geometric Sequence - When there is a common ratio, "r", between 2 terms. (Multiply by "r")

Recursive Formula  
 $a_n = a_{n-1} \cdot r$

$3, 6, 12, 24$   
 $\frac{24}{12} = \frac{6}{3} = \frac{12}{6}$

$1, 2, 4, 7, 11$   
+1 +2 +3 +4

- ① 2, 8, 14 (Arith.)
- ② 4, 8, 16 (Geom.)
- ③ 9, 3, 1 (Geom.)
- ④ 8, 4, 0 (Arith.)
- ⑤  $a_4 = 15 + 2i$
- ⑥  $a_4 = 12$

$$\textcircled{7} a_7 = 162$$
$$a_n = (a_{n-1}) \cdot 3$$

$$\textcircled{8} a_7 = \frac{13}{2}$$
$$a_n = a_{n-1} + \frac{3}{2}$$

HW: Pg. 256 # 3, 5, 7, 13, 15, 19, 20  
Pg. 269 # 5, 9, 13, 19, 23, 25  
Regents # 70-86 events

$$y = ax^2 + bx + c$$
$$0 = ax^2 + bx + c$$
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Nature of Roots

$$b^2 - 4ac$$

$$\text{Sum} = -\frac{b}{a} \quad \text{Prod} = \frac{c}{a}$$
$$r_1 + r_2 = -\frac{b}{a} \quad r_1 \cdot r_2 = \frac{c}{a}$$

60

Pg. 256 # 3-15 odd, 19, 20  
Pg. 269 # 3-25 odd