

## Math 365 Lecture Notes Section 1.1 – Explorations with Patterns

### ★ Exploring with Patterns

#### Definitions:

- 1) Natural Numbers:
  
- 2) Inductive Reasoning:
  
- 3) Deductive Reasoning:
  
- 4) Conjecture:
  
- 5) Counterexample:

### ★ Arithmetic Sequences

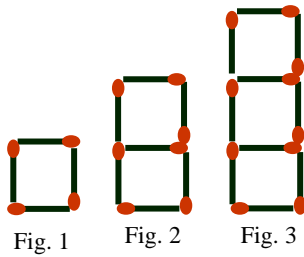
#### Definitions:

- 1) Sequence:
  
- 2) Arithmetic Sequence:

#### Important Formulas for Arithmetic Sequences:

**Problem 1:** Find the 50<sup>th</sup> term of an arithmetic sequence whose 2<sup>nd</sup> term is 24, and the 5<sup>th</sup> term is 33.

**Problem 2:** Find a pattern in the number of matchsticks required to continue the pattern shown below. Write a formula that gives the number of matchsticks required to form the  $n^{\text{th}}$  figure.



## ★ Geometric Sequences

### Definitions:

- 1) Geometric Sequence:

### Important Formulas for Geometric Sequences:

**Problem 3:** Two bacteria are in a dish. The number of bacteria triples every hour. Following this pattern, find the number of bacteria in the dish after 10 hours and after  $n$  hours.

**Problem 4:** Every day the fine on overdue books doubles. If the fine for returning the book one day late is 25¢, what is the fine for returning it a week late?

Part B: How long before the fine is over \$10.00?

★ **Other Sequences**

1) Triangular Numbers

2) Square Numbers

3) Fibonacci sequence

4) Recursive patterns

5) Other

Assuming that a sequence exists, find the seventh number in the sequence below:

10 16 24 37 58 90 \_\_\_

Correction: page 3,4: Does the pattern continue?