Problem Set 3

1. SEQUENCE PATTERNS

Find the next three terms in each sequence and explain your pattern in a sentence.

a. 2, 5, 10, 17, _____ _____ _____

b. 64, 32, 16, 8, 4, _____ _____ _____

c. 5, 10, 9, 18, 17, 34, 33, _____ _____ _____

d. 1, 3, 7, 13, 21, _____, _____ _____

e. 1, 5, 13, 29, 61, 125, _____ _____ _____

f. 1, 5, 13, 26, 45, 71, _____ _____ _____

g. 1, 2, 6, 24, 120, 720, _____ _____ _____

2. MORE SEQUENCE PATTERNS

Find the next four terms in each sequence.

a. 243, 81, 27, 9, 3, _____, _____ _____ _____

b. 4, 9, 8, 13, 12, _____, _____ _____ _____

c. 4, 5, 8, 13, 20, 29, 40, _____, _____ _____ _____

d. 3, 7, 13, 21, 31, 43, _____, _____ _____ _____

e. 5, 7, 11, 19, 35, 67, _____, _____ _____ _____

f. 1, 4, 13, 40, 121, 364, _____, _____ _____ _____

g. 3, 1, 4, 5, 9, 14, 23, 37, _____, _____ _____ _____

h. 7, —3, 10, —13, 23, —36, 59, _____, _____ _____ _____

i. 1, 2, 3, 6, 11, 20, 37, _____, _____, _____ _____

3. YOUR OWN SEQUENCE

Generate your own sequences. Write out seven terms for each sequence.

a. Generate an arithmetic sequence. (+, -)
b. Generate a geometric sequence. (X, ÷)
c. Generate a Fibonacci sequence.

4. BEACH BALL

Brittany has a beach ball. It is colored with six vertical sections, in order: white, orange, yellow, blue, red, and green. She spins the beach ball, and she notices that the colors whir by very fast. If the first color to go by is white and the ball spins around so that 500 colors go by, what is the 500th color?

5. **LAST DIGIT**

What is the digit in the ones place of 2^{53}

6. EMAIL VIRUS

In 2008 a computer virus was launched through the Internet. This virus came in the form of an email message that replicated itself via the first 50 email addresses in a recipient's address list. For example, person A sends the message to person B, who inadvertently sends a copy of the message to the first 50 people in his email address book.

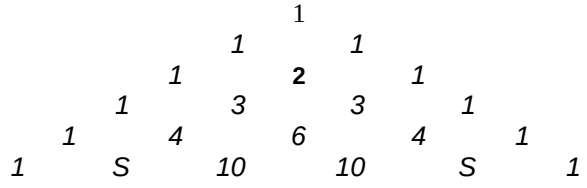
Assume that there are no duplicate recipients. If the first email is called the first generation, how many total emails will have been serf in the first five generations?

7. BEES

A male bee is born from an unfertilized egg, a female bee from a fertilized one. In other words, a male bee has only a mother, whereas a female bee has a mother and a father. How many total ancestors does a male bee have going back ten generations? (Try drawing a diagram to help organize this problem's information.)

8. PASCAL'S TRIANGLE

This triangle is called Pascal's triangle. Find a pattern that will produce the next row. Then copy the triangle and determine the next four rows.



Look for other patterns in Pascal's triangle. Write down three of them.