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CMSC 203 - Fall 2009 - Homework Assignment 3 - Due November 23, 2009

1. Find the terms a_3 , a_4 , a_5 , and a_6 for the recursively defined sequence given by:

$$a_0 = 0, a_1 = 1, a_2 = 1, \text{ and } a_n = (a_{n-1})(a_{n-3}) - 2(a_{n-2}) \text{ for } n > 2.$$

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2. Using Mathematical Induction, prove $\sum_{i=0}^n i^2 = \frac{n(n+1)(2n+1)}{6}$.

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3. Using the Strong Form of Mathematical Induction to prove the following:

If $a_0, a_1,$ and a_2 are odd Integers and $a_n = (a_{n-1})(a_{n-2})(a_{n-3})$, then a_n is odd for all $n > 2$.

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4. If a state wants to issue license plates using 26 letters or 10 digits, how many plates can they make with:

(a) 4 letters followed by 3 digits?

(b) each character either a letter or a digit?

(c) each character either a letter or a digit, but either the first is A or the last is 9 or both?

(d) 4 letters followed by 3 digits with each distinct?

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5. Suppose I have 18 different math, 16 different chemistry, 14 different physics, and 12 different biology books.

(a) How many ways can I line these books on shelf that is only large enough to hold 20 books?

(b) How many ways can I line them up ordering 5 of each type, so that all the books of the same type are grouped together?

(c) How many ways can I *choose* 15 books with no more than 2 physics books in any collection?

(d) How many ways can I choose 10 math or physics and 10 chemistry or biology books?

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6. The Mars Candy Company sells bags of M&Ms with 300 pieces candy colored from 10 different colors.

(a) How many different bags can they produce?

(b) How many different bags can they produce if each bag must contain at least 25 of each color?