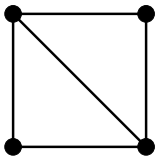
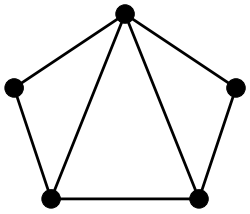
Utah Math Circle. Contest 1. Fall 2008.

Name: _____ October 29, 2008

Problem 1. What are the chromatic number and the chromatic polynomial for each of these graphs?

(1) 

(2) 

(3) The cycle, C_n, on n vertices.

(4) Any tree (a tree is a connected graph with no cycles in it).

Problem 2. Here is part of the course schedule for the Math Department for the upcoming Spring semester.

#	**Course**	**Time**
6220	Complex Analysis	12:55 p.m. - 1:45 p.m.
6250	Lie Groups and Lie Algebras	10:00 a.m. - 10:50 a.m.
6320	Modern Algebra	11:50 a.m. - 12:40 p.m.
6420	Partial Differential Equations	09:10 a.m. - 10:30 a.m.
6520	Introduction to Algebraic Topology	10:45 a.m. - 11:35 a.m.
6620	Analysis of Numerical Methods	11:50 a.m. - 12:40 p.m.
6720	Applied Complex Variables	12:25 p.m. - 1:45 p.m.
6740	Bifurcation Theory	12:05 p.m. - 2:05 p.m.
6780	Mathematical Biology	12:25 p.m. - 1:45 p.m.
7830	Topics in Commutative Algebra	10:25 a.m. - 11:55 a.m.
7853	Topics in Geometric Group Theory	10:45 a.m. - 11:35 a.m.
7890	Topics in Representation Theory	12:55 p.m. - 1:45 p.m.

How many rooms do we need?

Problem 3. How many numbers in the set $\{1, 2, 3, 4, \ldots, 360\}$ have at least one prime divisor in common with 360?

Problem 4. Consider an $n \times n$ table with the following entries from left to right: on the first row, $1, 2, \ldots, n$, on the second row, $(n+1), (n+2), \ldots, 2n; \ldots$; on the n-th row, $(n-1)n+1, (n-1)n+2, \ldots, n^2$. For example, if $n = 4$, the table is

1	2	3	4
5	6	7	8
9	10	11	12
13	14	15	16

We choose n entries of the table such that no two are in the same row or column. (For example, when $n = 4$, we may choose $1, 7, 12, 14$, but not $2, 6, 11, 16$.)

What are the possible values of the sum of the n entries we selected?