

North Dakota Mathematics Talent Search 2006-2007
Problem Set 2
Problems due March 15th, 2007

1. Of 100 people seated at a round table, more than half are children. Prove that there are two children who are seating diametrically opposite each other.
2. Show that in any group of five people, there are two who have an identical number of friends within the group.
3. Twenty-five boys and 25 girls are seated at a round table. Show that both neighbors of at least one student are boys.
4. Given the pair of prime numbers p and $8p^2 + 1$, find p .
5. Consider the set $A = \{a_1, a_2, \dots, a_n\}$ consisting of integers. Prove that A has a non-empty subset with the property that the sum of its elements is a multiple of n .