Name:

Pid: \_\_\_\_\_

1. Show that if  $a, b \in \mathbb{Z}$ , then  $a^2 - 4b + 2 \neq 0$ .

2. Show that there are irrational numbers a and b such that  $a^b$  is rational.

3. We denote by  $\{0,1\}^n$  sequences of 0's and 1's of length n. Show that it is possible to order elements of  $\{0,1\}^n$  so that two consecutive strings are different only in one position.

4. Let us define n! as follows: 1! = 1 and  $n! = (n - 1)! \cdot n$ . Show that  $n! \ge 2^n$  for any  $n \ge 4$ .