

Math 300: Problems for October 20, 2005

1. Using induction, prove the following for each natural number n :

$$\begin{pmatrix} a & 1 \\ 0 & a \end{pmatrix}^n = \begin{pmatrix} a^n & na^{n-1} \\ 0 & a^n \end{pmatrix}.$$

2. Use induction to prove that $2^n < n!$ for all natural numbers $n \geq 4$.