

1. Prove by induction on n that

$$n! > 4n^2$$

for all integers $n \geq 5$.

2. Let f_n denote the n th Fibonacci number ($f_0 = 0$, $f_1 = 1$, and $f_{n+2} = f_{n+1} + f_n$). Prove by induction on n that

$$\sum_{i=1}^n f_{2i} = f_{2n+1} - 1$$

for all positive integers n .