

NAME: _____

This quiz contains 4 problems worth 30 points. You may not use books, notes, or a calculator. You have 30 minutes to take the quiz.

1. (6 points) Prove that for all integers m and n , if m is even and $m+n$ is even, then n is even.

2. (7 points) Use Proof by Contrapositive to prove that for all real numbers x and y , if $x+2y \geq 3$, then $x \geq 1$ or $y \geq 1$.

3. (8 points) Use Mathematical Induction to prove $\frac{1}{1 \cdot 2} + \frac{1}{2 \cdot 3} + \frac{1}{3 \cdot 4} + \cdots + \frac{1}{n(n+1)} = \frac{n}{n+1}$ for all integers $n \geq 1$.

4. (9 points) Use Mathematical Induction to prove $2n + 1 \leq 2^n$ for $n = 3, 4, \dots$.