

### Math Circle Problems for week 7

1. Evaluate  $\frac{1}{1 \cdot 3} + \frac{1}{3 \cdot 5} + \frac{1}{5 \cdot 7} + \dots + \frac{1}{2001 \cdot 2003}$

2. Prove that if  $a, b, c \geq 0$ , then  $(ab + bc + ac)^2 \geq 3abc(a + b + c)$

3. Show that

$$\binom{n}{0} + 2 \binom{n}{1} + \dots + 2^{n-1} \binom{n}{n-1} = 3^n - 2^n$$