MATH 052: FUNDAMENTALS OF MATHEMATICS
REVIEW, EXAM #2

Problem 1. Prove by induction that
$$1^3 + 2^3 + \cdots + n^3 = \frac{n^2(n+1)^2}{4}$$
for all integers $n \geq 1$.

Problem 2. Let $a, b \in \mathbb{Z}$. Prove that if $a + b$ and ab are of the same parity if and only if a and b are even.

Problem 3. Let $x, y \in \mathbb{R}_{>0}$. Prove by contradiction that $\sqrt{x+y} \neq \sqrt{x} + \sqrt{y}$.