1. (Induction) Prove that, for any positive integer $n$, \( \sum_{i=1}^{n} i^2 = \frac{n(n+1)(2n+1)}{6} \).

2. Dividing $n$-gon

Assume that any simple (but not necessarily convex) $n$-gon ($n > 3$) has a diagonal (line between two non-adjacent vertices) that lies completely within the $n$-gon. Show that any such $n$-gon ($n \geq 3$) can be divided into $n - 2$ triangles such that all vertices of each triangle are vertices of the $n$-gon.
3. Convergence of Series

Use induction to prove that for all integers $n \geq 1$,

$$\sum_{k=1}^{n} \frac{1}{3k^{3/2}} \leq 2.$$

*Hint:* Strengthen the induction hypothesis to

$$\sum_{k=1}^{n} \frac{1}{3k^{3/2}} \leq 2 - \frac{1}{\sqrt{n}}.$$