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SYNOPSIS

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This is the second of a four part series by Crux editor J. Chris Fisher. The
goal of the series is to study Harmonic sets. This instalment looks at quadrangles and quadrilaterals and introduces Harmonic sets and Harmonic conjugates.
This is the first of a three part series of articles investigating the centroid of vertices, centroid of perimeter and centroid of area for a plane noncrossed quadrangle. In this first installment, it is shown that the centroid of vertices, centroid of area and the point of intersection of the diagonals of a convex quadrilateral, not a parallelogram, are collinear.

Let $x, y, z$ be positive real numbers. Prove that

$$\frac{x^2}{z^3(zx + y^2)} + \frac{y^2}{x^3(xy + z^2)} + \frac{z^2}{y^2(yz + x^2)} \geq \frac{3}{2xyz}.$$