Flanders Math Olympiad 2002

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1 Is it possible to number the 8 vertices of a cube from 1 to 8 in such a way that the value of the sum on every edge is different?

2 Determine all functions $f : \mathbb{R} \to \mathbb{R}$ so that $\forall x : x \cdot f(\frac{x}{2}) - f(\frac{2}{x}) = 1$

3 show that $\frac{1}{15} < \frac{1}{2} \cdot \frac{3}{4} \cdots \frac{99}{100} < \frac{1}{10}$

4 A lamp is situated at point A and shines inside the cube.
A (massive) square is hung on the midpoints of the 4 vertical faces.
What's the area of its shadow?
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s400/2002%2Bflanders%2Bp4.png