

Belgium Flanders Mathematical Olympiad 2002

- 1 Is it possible to label the 8 vertices of a cube by numbers from 1 to 8 so that the value of the sum on every edge is different?
- 2 Determine all functions $f : \mathbb{R} \rightarrow \mathbb{R}$ so that for all $x \in \mathbb{R}$

$$x \cdot f\left(\frac{x}{2}\right) - f\left(\frac{2}{x}\right) = 1.$$

- 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 is the area of its shadow?

