Turn in your solution to at least two of the problems. **Explain your solution in full sentences.** Give detailed reasonings. Include diagrams and figures if appropriate.

**Problem 1.** A cube of butter is covered by black pepper on the surface. We cut the cube into two pieces with a knife so that a yellow plane polygon now becomes visible. What kind of regular polygons can we make this way?

**Problem 2.** Let \( a_1 \geq a_2 \geq a_3 > 0 \) and \( b_1 \geq b_2 \geq b_3 > 0 \). Show that \( a_1 b_1 + a_2 b_2 + a_3 b_3 \) is the maximum of the set of all similar expressions.

**Problem 3.** Solve the inequality

\[
\frac{|4x - 1|}{x^2 + x} - 1 \geq 0.
\]

Hint: When is the value of a fraction nonnegative?