Problem 1. Suppose an arbitrary triangle has interior angles α, β and γ. Show that

$$\sin\frac{\alpha}{2}\sin\frac{\beta}{2}\sin\frac{\gamma}{2} \le \frac{1}{4}.$$

Problem 2. The area A and an angle θ of a triangle are given. Determine the lengths of the sides a and b so that the side opposite θ is as short as possible.

Problem 3. A convex octagon inscribed in a circle has 4 consecutive sides of length 3 units and 4 consecutive sides of length 2 units. Find its area. Express your answer in the form $r + s\sqrt{t}$ where r, s, t are natural numbers.