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Problem 1 Determine the set of all real numbers α with the following property: For each positive c there exists a rational number $\frac{m}{n}$ $(m\in\mathbb{Z},n\in\mathbb{N})$ different than α such that

$$\left|\alpha-\frac{m}{n}\right|<\frac{c}{n}.$$

Problem 2 Determine all 6-tuples (p,q,r,x,y,z) where p,q,r are prime, and x,y,z natural numbers such that $p^{2x}=q^yr^z+1$.

Problem 3 Assume that the equality $2BC=AB+AC$ holds in $\triangle ABC$. Prove that:

(a) The vertex A, the midpoints M and N of AB and AC respectively, the incenter I, and the circumcenter O belong to a circle k.
(b) The line GI, where G is the centroid of $\triangle ABC$ is a tangent to k.
