Open problems

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Let K and L be algebraically closed fields contained in some common larger field. Assume $K \not\subseteq L$ and $K \not\supseteq L$. Can it happen that the compositum KL is algebraically closed?

Remark It can be shown that this cannot happen if K and L are linearly disjoint over $K \cap L$.

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Let, for a form $F \in \mathbb{Z}[x_1, ..., x_r]$, $C(F)$ and $D(F)$ be the greatest common divisor of the coefficients of F and of the values of F at $\mathbb{Z}^r$, respectively. Is the maximum of $D(F)$ for F with $C(F) = 1$ of degree d in r variables attained at a form splitting over $\mathbb{Z}$?

Remark The answer is affirmative for $d < 9$ and every r or for $r < 3$ and every d.

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Do there exist for every quadratic polynomial f in $\mathbb{Z}[x]$ positive integers $x < y$ such that $f(x)$ and $f(y)$ have the same prime factors?

Remark The answer is affirmative if the linear part of f is 0.