



John Baez <johnb@ucr.edu>

maschke's theorem

2 messages

JAMES DOLAN <james.dolan1@students.mq.edu.au>

Fri, Mar 24, 2023 at 9:53 AM

To: john.baez@ucr.edu

at some point i should probably ask you to tell me more about that "maschke's theorem" you were telling me about

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John Baez <john.baez@ucr.edu>

Fri, Mar 24, 2023 at 12:24 PM

Reply-To: baez@math.ucr.edu

To: JAMES DOLAN <james.dolan1@students.mq.edu.au>

Hi -

| at some point i should probably ask you to tell me more about that "maschke's theorem" you were telling me about

It might have been a bit irrelevant to what we were trying to understand, but it says:

If G is a finite group, its group algebra over some field F is semisimple if the order of G isn't divisible by the characteristic of F .

So, if $\text{char}(F)$ doesn't divide $|G|$, every finite-dim rep of G is a sum of irreps. But these irreps could still have "exciting" endomorphism algebras, not just F .

There are other similar things, too, like: the irreps of S_n are "just the usual ones coming from Young diagrams" if $n < \text{char}(F)$. In this case $\text{char}(F)$ doesn't divide $n!$.

So, there's some interesting sense in which as the prime approaches infinity, the representation theory of S_n over the field with p elements boils down to the theory of Young diagrams.

Best,

jb