## 2008 PUMaC C8

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How many SET-preserving automorphisms are there of the SET deck?

Since the SET deck is isomorphic to  $\mathbb{F}_3^4$  with SETs being equivalent to x+y+z=0, we are looking for the number of invertible affine transformations from  $\mathbb{F}_{3^4}$  to itself, which is  $3^4 \left(3^4-1\right) \left(3^4-3\right) \left(3^4-3^2\right) \left(3^4-3^3\right) = \boxed{1965150720}$  as desired.