

Chris Bendel and Peter Cholak Math 222 - Quiz 11 Monday, April 19

Be sure to carefully write up your answers. It is suggested that you first write out a draft of your proposed questions and then carefully rewrite that draft to get your final version. You do *not* have to write the answers on this sheet of paper.

Which of the following are isomorphisms? Explain why or why not.

(a) $f : (\mathbb{R} > 0, \cdot) \rightarrow (\mathbb{R} > 0, \cdot)$ by $f(x) = x^2$.

(b) $f : (\mathbb{R}, +) \rightarrow (\mathbb{R}, +)$ by $f(x) = x^3$.

(c) Let $G = \left\{ \begin{pmatrix} a & a \\ a & a \end{pmatrix} : a \in \mathbb{R} \right\}$ under matrix addition. $f : (\mathbb{R}, +) \rightarrow G$
by $f(a) = \begin{pmatrix} a & a \\ a & a \end{pmatrix}$.

(d) $f : (\mathbb{Z}, +) \rightarrow (\mathbb{Z}, +)$ by $f(x) = 2x$.

Consider the subgroup $H = \{Id, (1234), (13)(24), (1432)\}$ of S_4 . Up to isomorphism, there are only two groups of order 4: $(\mathbb{Z}_4, +)$ and K . Which is H ? Why?

Find a subgroup of S_4 of order 4 which is isomorphic to the other one, i.e. the one that wasn't the answer to the previous problem.