Exam: Set Theory, Spring 2017

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- Prove that for infinite κ, $\kappa \cdot \kappa = \kappa + \kappa = \kappa$.

- Tell the story of the construction of the reals, starting with the natural numbers and passing through the integers and the rational numbers. How are addition and multiplication defined in all of these structures? Why are these operations commutative? How is one structure embedded in the next?

- State two versions of the axiom of choice and prove that that they are equivalent.

- What is the rank of the set of all functions from the real numbers to the real numbers?

  For those who did not take the midterm exam:

- State and prove the transfinite recursion theorem on ω.