MATH 214 Fall 2014 Homework #1

Professor Adam Kapelner

Due 11:59PM in my office, Thursday Feb 5, 2015

(this document last updated Tuesday 30th December, 2014 at 8:55am)

Holes in $\mathbb{Q}$ Problems below are related to set theory. The sets we talk about in class are composed of outcomes in a universe that are events. Some of the problems below will be about abstract sets that are divorced from the sets used in probability.

Problem 1

We will investigate holes in $\mathbb{Q}$.

(a) [harder] If the number $q \in \mathbb{Q}$ is prime, prove that $\sqrt{q} \notin \mathbb{Q}$.

(b) [harder] If the number $q \in \mathbb{Q}$ is prime, prove that $\sqrt[n]{q} \notin \mathbb{Q}$ where $n \in \mathbb{N}$ and $n > 1$.

(c) [harder] Let $A = \{q \in \mathbb{Q} : q^2 < 2\}$. Show that $\max\{A\}$ does not exist.