Abstract. In a 2005 paper, John Burgess and Gideon Rosen offer a new argument against nominalism in the philosophy of mathematics. The argument proceeds from the thesis that mathematics is part of science, and that core existence theorems in mathematics are both accepted by mathematicians and acceptable by mathematical standards. David Liggins (2007) criticizes the argument on the grounds that no adequate interpretation of "acceptable by mathematical standards" can be given which preserves the soundness of the overall argument. In this discussion I offer a defense of the Burgess-Rosen argument against Liggins’s objection. I show how plausible versions of the argument can be constructed based on either of two interpretations of mathematical acceptability, and I locate the argument in the space of contemporary anti-nominalist views.

Keywords: nominalism, mathematical naturalism, indispensability.

1. A New Anti-Nominalist Argument

In their 2005 paper, ‘Nominalism Reconsidered’ [1], John Burgess and Gideon Rosen present an argument against nominalism in the philosophy of mathematics. Their focus is on what they refer to as “core existence theorems”. These are established claims which assert the existence of some kind of mathematical entity, for example that there are infinitely many prime numbers. The basic structure of the argument is as follows:

(1) Core existence theorems are fully accepted by mathematicians.
(2) Core existence theorems are acceptable by mathematical standards.
(3) Mathematics is part of science.
(4) Hence core existence theorems are acceptable by scientific standards.

(C) Hence we (as philosophers) ought rationally to believe in the existence of mathematical objects.

This argument has already attracted some attention in the literature [2, 4], however critiques that have appeared to date have failed, I think, to fully
appreciate its novelty. ‘New’, of course, does not necessarily mean ‘good’, but it will aid our evaluation of the above argument if we take some time to separate it from two other prominent lines of attack against nominalism. These two other positions — mathematical naturalism, and indispensabilism — can be distinguished by their different attitudes towards the relationship between mathematics and science. Mathematical naturalism, championed most prominently by Penelope Maddy, takes mathematics to be a free-standing, fully autonomous discipline, not in need of any external legitimization by science. Indeed applying scientific standards and methodology to mathematics, argues the mathematical naturalist, often leads to conflict with actual mathematical practice. Indispensabilism, based originally on the work of W.V.O. Quine and Hilary Putnam, takes a very different view. For the indispensabilist, the only non-question-begging argument against nominalism proceeds from the (alleged) indispensability of mathematics in scientific theorizing. On this view, mathematics is external to science but gets its ontological legitimacy from the nature of its relationship to science. The Burgess-Rosen argument is different again: it proceeds from the assumption, encapsulated in premise (1), that mathematics is part of science.

Somewhat surprisingly, defense of this claim is conspicuous by its absence from Burgess and Rosen’s paper. However, Charles Chihara [2, page 68] alludes to an earlier unpublished paper of Burgess:

“In his discussion of a paper by Penelope Maddy, [Burgess] defends his classification of mathematicians as scientists by citing the fact that the American Association for the Advancement of Science (‘the professional meta-association whose members are professional associations of scientists’) has the American Mathematical Society as a long-standing and respected member.”

More clearly needs to be said here, especially given the novelty of this claim with respect to the background literature.

A second way in which the current argument differs from mathematical naturalism and indispensabilism is in its emphasis on the attitudes — both actual and potential — that mathematicians take towards the various mathematical claims in their theories. The reason for this emphasis comes from Burgess and Rosen’s apparent wish to embrace scientific naturalism while avoiding any reliance on holism. With both naturalism and holism in place, as is the case with the Quinean underpinnings of indispensabilism, it would be a short step from mathematics being part of science to belief in the existence of mathematical objects. However, Burgess and Rosen’s avoidance