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Michael Liston* (mnliston@uwm.edu), Philosophy, UW-Milwaukee, PO Box 413, Milwaukee, WI 53201. *Indispensability Arguments in Philosophy of Mathematics: their Scope and Limits.*

Most science requires applied mathematics. This truism underlies indispensability arguments: since scientists make indispensable use of mathematics in describing and reasoning about empirical phenomena, one cannot coherently believe our scientific theories yet withhold belief in their mathematical portions. Because of seamless entanglements between mathematics and science, if one accepts science as objectively true, one must similarly accept mathematics. Indispensability is thereby used to argue that mathematical applications distinguish mathematics as an objective science from merely formal games, fictions, or other human constructions; mathematical truth (like empirical truth) is distinct from correctness in a game, a story, or a construction. These arguments, due to Quine and Putnam, have greatly shaped general philosophy of mathematics since 1980, and two styles of response to them have developed. A science-without-numbers response denies indispensability; an AS-IF response denies the inference from indispensability to objective truth. Both argue that mathematics does not need to be true to be good. My paper will critically examine these arguments for mathematical realism, the responses to them, and what they show about mathematical truth, existence, and determinacy. (Received July 11, 2019)