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Polynomial time bounded truth–table reducibilities to padded sets

Abstract: We study bounded truth-table reducibilities to sets of small information content called padded (a set is in the class f-PAD of all f-padded sets, if it is a subset of $\{x10^{f(|x|)-|x|-1}; x \in \{0,1\}^*\}$). This is a continuation of the research of reducibilities to sparse and tally sets that were studied in many previous papers (for a good survey see [HOW1]). We show necessary and sufficient conditions to collapse and separate classes of bounded truth-table reducibilities to padded sets. We prove that depending on two properties of a function f measuring "holes" in its image, one of the following three possibilities happen:

$$R_{\mathrm{m}}(f\text{-PAD}) \subsetneq R_{\text{1-tt}}(f\text{-PAD}) \subsetneq ... \subsetneq R_{\text{btt}}(f\text{-PAD}), \text{ or} R_{\mathrm{m}}(f\text{-PAD}) = R_{\text{1-tt}}(f\text{-PAD}) \subsetneq ... \subsetneq R_{\text{btt}}(f\text{-PAD}), \text{ or} R_{\mathrm{m}}(f\text{-PAD}) =$$

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