Toward a proof of the gap theorem

Evan Bergeron & Tim Becker

January 29, 2017

We found a couple of issues in the current proof sketch.

Does the parity of $p_w(c_1 + d)$ indicate whether $\mathfrak{A}(A, c_1 + d)$ copies the bit after w, starting at $2(c_1 + d)$? This seems critical to the proof's function, and does not seem to not be the case with the current definition. Changing our definition of p_w to

$$p_{wa} = \begin{cases} A \cdot p_w(x) & \text{if } p_w(x) \text{ is even} \\ A \cdot p_w(x) + (-1)^a x & \text{otherwise} \end{cases}$$

seems to ensure this (change the casing from $p_w(c_1)$ to $p_w(x)$).

p_w is not a map from $\mathbb{Z}^m$ to $\mathbb{Z}^m$, as the input vectors could have one-halves in them (in particular c_1 is not integral). Instead, we define $p_\epsilon(x) = x$ and consider $p_w(2(c_1))$ and $p_w(2(c_1 + d))$.

Some notational confusion: What is $\mathfrak{C}(A, r)$? Is $\mathfrak{A}(A) = \mathfrak{A}(A, c_1)$?