SUBSETS OF $\mathbb{F}_p^d$ WHERE NO THREE ELEMENTS SUM TO ZERO.

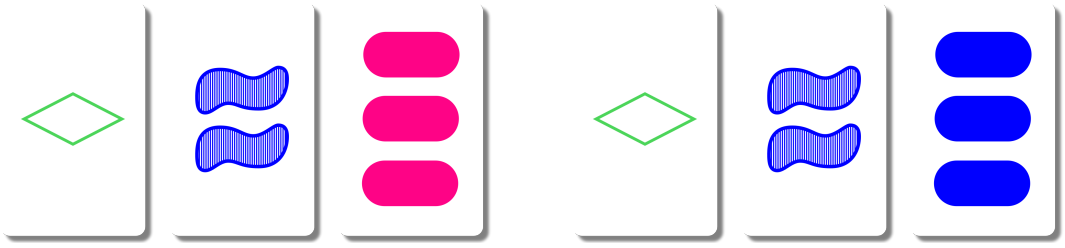
Abstract. In this paper, we do some stuff that I havent quite decided yet.

1. Introduction and Background

Deep mathematical richness often arises from the simplest of structures, and the card game *SET* exemplifies this. Each SET card contains four features, with three possibilities for each feature. These are:

- Colour (red, green or purple),
- Shading (solid, striped, open),
- Shape (diamond, squiggle, oval),
- Number of Shapes (one, two, or three).

Three cards are said to form a SET if, for each of the four features, the three cards have that feature as either all the same or all different.



(a) Colour, Shading, Shape and Number are all different.

(b) The second and third card have the same colour, so colour is *not* all the same or all different for the three cards.

Figure 1. An example of a valid SET and an invalid SET

In the figure above, by these rules (A) is a valid SET, while (B) is not. Note that B *would* be a valid set if the diamond was blue.