Tutorials, Week 3

Problem P1 (Fundamentals of codes)

A code

$$C = \{\varnothing\varnothing AA,\ \ell\ell AA,\ rrAA,\ ddAA,\ uuAA,\ \varnothing\varnothing BB,\ \ell\ell BB,\ rrBB,\ ddBB,\ uuBB\}$$

is built to encode certain moves of a videogame as a combination of inputs from a controller with four directions and two buttons.

a) Write down the parameters of C.

b) Determine how many errors C can detect.

c) Determine how many errors C can correct.

d) Prove that the code C is not perfect.

e) Suppose a game character executes a unique move corresponding to the inputs received, in case they are a valid combination of inputs. Explain that, if a player presses a single wrong button or a single wrong direction when executing the full movement, their character in the game will either stay idle (i.e., won't do anything) or perform an unintended move.