Homework 6

Redefining a graph

In class we wanted to design a statistical decision theoretic to answer the question posed by Fino and Yuste regarding connection selectivity between sGFP and PC cells. We wanted to find if the probability of a sGFP cell being connected to a PC cell given that 2 PC cells are connected and the second PC cell is also connected to the sGFP cell is the same as the probability of a PC cell being connected to a sGFP cell, given that another PC cell is. In other words, we want to find if $P(3|1,2) = P(3|1)$ (see figure 1).
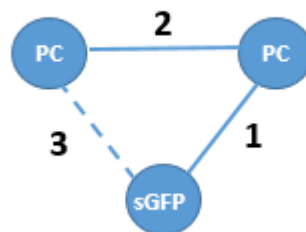

Figure 1. The connections between the PC and sGFP cells

I wonder if a better way to answer this question would be to use the edge graph L(G) of the graph G defined by Fino and Yuste, i.e. such that each vertex of L(G) represents an edge of G and two vertices of L(G) are adjacent if and only if their corresponding edges share a common endpoint.
From this graph we could then try to estimate the probabilities by finding the proportion of vertices representing edge 3 connected to both 1 and 2 and the vertices for edge 3 connected to vertices representing edge 1 only.