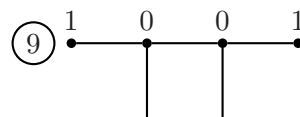
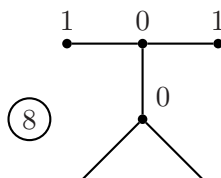
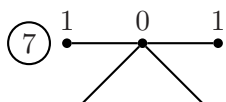
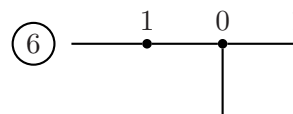
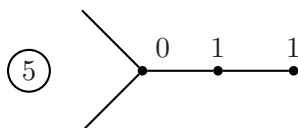
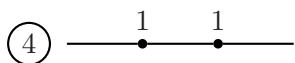
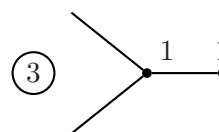
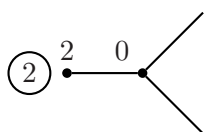
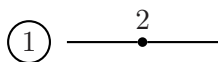


Finding the Serre polynomials of some moduli spaces of stable maps

This project is related to string theory and the enumerative geometry of curves. String theory is part of a revolution in physics that aspires to explain all the forces and particles of physics in a unified way, starting from first principles. The enumerative geometry of curves involves counting the number of curves in some space that satisfy certain conditions. But don't let these fancy-sounding connections fool you—in large part, this project boils down to figuring out the possible configurations of some graphs with labeled vertices. (There are some rules that limit which configurations are allowed.) It doesn't take much work to get started in graph theory; many undergraduates do research in this area. Plus, you can still mention the connections to string theory, which will sound really cool and impress people. (It works for me! :)

Below you'll find an example from my dissertation of the kind of graphs involved. For this particular moduli space, I found there were 10 possible graphs. (Type 6 below has a double.)



This project does not involve original research, because Getzler and Pandharipande have already found the Serre polynomials of all the moduli spaces of this type. (See <http://front.math.ucdavis.edu/math.AG/0502525> .) However, they used an extremely advanced approach that is not very intuitive. (At least I can't understand it!) This project has the potential to develop a clearer and more direct approach to finding these Serre polynomials in some simple cases.