PROJECT PROPOSAL
REU SUMMER 2005
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For the past year I have been studying groups of the form $F_n \times|_f\ Z$, (F_n semi-direct Z) where f is an automorphism of a free group. Over the summer I would like to continue my work on these groups. From the past semesters I read through various articles by Thomas Brady to get a good list of groups $F_n \times|_f\ Z$, where f is an automorphism of a free group of rank three and less, that can act geometrically on a CAT(0) 2-simplex. A group that can act geometrically on a CAT (0) space is said to be a CAT (0) group. This however did not lead to a generalization in the obvious way. It may be true that some of these groups can act geometrically on a CAT (0) 3-simplex. Steve Gersten showed gave an example of $F_n \times|_f\ Z$ that cannot act geometrically on any CAT (0) space. For the summer, I would like to answer the generalization of Brady's findings: When can $F_n \times|_f\ Z$, where f is an automorphisms of a free group of rank greater than three, act geometrically on a CAT (0) 2-simplex? If $F_n \times|_f\ Z$ cannot act geometrically on a CAT (0) 2-simplex under what conditions will it have a Z^2 subgroup?

Another property that I have been looking at is the relation between δ-hyperbolic and CAT (0) hyperbolic. A space is said to be δ-hyperbolic if for every geodesic triangle there exists a δ>0 such that the union of a δ-neighborhood of two distinct sides contains the third side. We then define what it means for a group to be δ-hyperbolic by requiring that its Cayley graph satisfy the δ-hyperbolic condition given above. In an article written by Martin Bridson he proves that if G is δ-hyperbolic and acts on a CAT (0) space then they act with no embedded flat planes. Therefore we will have a distinction between groups that are CAT (0) groups and those groups that are δ-hyperbolic groups. A question to ask then is: If G is δ-hyperbolic, how do you decide that G is CAT (0)?

Next Fall, I will be attending the University of Utah as a first year graduate student. I have also received a graduate teaching assistantship for next year. I believe that the past year's REU has been a very valuable part of my education at the University of Utah.