Math 10270 : Quiz 2

A Roman arch consists of 3 voussoirs of the same size. The two side voussoirs each weigh 200 lbs but the keystone weighs 300 lbs. Assume that the keystone is held in place without friction.

(a) Sketch such an arch and supporting columns, labeling the angles made by the voussoirs with the center of the span and the forces acting on each voussoir.

(b) Find the forces acting between the side voussoirs and the keystone, and between the supporting columns and the side voussoirs. (You can give the forces in coordinate form.)

(c) What is the horizontal component (the frictional part) of the forces applied by the columns? Do these forces point in towards the center of the arch or away from the arch?