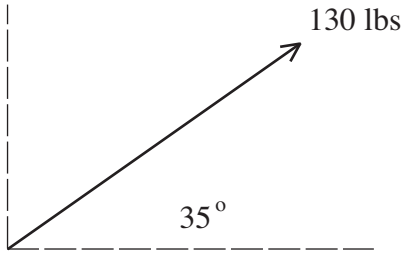
Quiz 2. Math 10-270. February 9, 2011. Name

1) The vector in the diagram below represents a force of magnitude 130 pounds. Draw into the diagram the horizontal and vertical components of this force and compute their magnitudes.



2a) Make a careful drawing of a semicircular Roman arch that has 5 identical voussoirs.

2b) Can a semicircular arch with 5 identical voussoirs be constructed with straightedge and compass? Why or why not?

2c) Given that each voussoir weighs 250 pounds, estimate the horizontal force with which the keystone pushes outward in each direction. (Select from the formulas below.)

Formulas: $H_0 = \frac{W}{2} \cdot \frac{1}{\tan \frac{\alpha}{2}}$, $H_1 = W \cdot \frac{1}{\tan \frac{3\alpha}{2}}$, $H_2 = W \cdot \frac{1}{\tan \frac{5\alpha}{2}}$, $P_0 = \frac{W}{2} \cdot \frac{1}{\sin \frac{\alpha}{2}}$, $P_1 = W \cdot \frac{1}{\sin \frac{3\alpha}{2}}$, $P_2 = W \cdot \frac{1}{\sin \frac{5\alpha}{2}}$.

3) Describe the important structural features of the Pantheon (these are features that pertain to the structural stability of the building).