Worksheet #17
Math 221

Instructions. Put the first and last name of everyone in your workgroup at the top of your paper. Everyone is to do their own worksheet but only one from each group is graded with the score shared. Be sure to show your work and explain your reasoning.

1. The sum of two positive numbers is 200. What is the maximum possible value for their product?

2. What is the area of the largest rectangle that can fit with one edge on the $x$-axis, one edge on the $y$-axis and touching the line $y = 2 - x$ at one point?

3. Show that the point between two posts of fixed lengths $A$ and $B$ which minimizes the distance $\alpha + \beta$ has the property that $\frac{a}{b} = \frac{A}{B}$.

4. (Snell’s Law) A ray of light will travel between two mediums by a path that will minimize the time taken. For example, if light travels in air at a velocity $v_1$ and in water at a velocity $v_2$, then to get from point $P$ above the water to point $Q$ below the water light will take the path as pictured that takes the least time.

Show Snell’s Law, which states that

$$\frac{\sin \theta_1}{\sin \theta_2} = \frac{v_1}{v_2}$$