

**Math 141****Optimization**

1. Knox Box wants to make a rectangular box with a square base and no top. The volume will be 2 cubic feet. What dimensions will minimize the surface area?
2. Knox Box wants to make a rectangular box with a square base. The volume will be 2 cubic feet. The cost for the sides and the top is 5 cents per sq. foot, while the reinforced bottom costs 8 cents per sq. ft. What dimensions will minimize the cost?
3. Wild Child Daycare is building a DIF (dirt interface facility) along the back of their building. It will be fenced on three sides. They have 150 feet of fence. How large an area can they enclose?
4. Cut squares from the corners of an  $8\frac{1}{2}$  x 11 inch sheet of paper and fold it into a box with no top. What size cut will maximize the volume?
5. Billy Bob's Guttering ("We keep our minds on our work") is constructing gutters from aluminum rolls that are 12 inches wide. They will bend them into thirds of width 4 inches. How should they fix the angle so as to maximize the cross sectional area? Assume that the two angles are equal.
6. The fire department is checking out the new art museum. They note a long corridor (width a feet) meeting a narrower corridor (width b ft) at right angles. What's the length of the longest ladder that can be carried horizontally around the corner?
7. Book #36 The frame of a kite is to be built as shown. The four exterior pieces are already cut. To maximize the area of the kite how long should the diagonals be made? The book lists this as a problem requiring a "computer algebra system." By using the angle between the two different pieces as the parameter, show that even calculus is not required for the solution.