

## Optimization Problems

1. Find a positive number such that the sum of this number and its reciprocal is as small as possible.
2. An open rectangular box is to be made from a rectangular piece of metal with dimensions  $16 \text{ cm} \times 10 \text{ cm}$  by cutting a square from each corner and folding up the sides (the 4 squares have the same dimensions). Determine the size of the squares that when cut out result in a box whose volume is as large as possible. What are the dimensions and volume of this box?

**Example:** If a  $1 \text{ cm} \times 1 \text{ cm}$  square is cut out of each corner of the rectangular sheet, then the resulting box has dimensions  $14 \text{ cm} \times 8 \text{ cm} \times 1 \text{ cm}$  and its volume is  $14 \cdot 8 \cdot 1 = 112 \text{ cm}^3$ .

3. Find the slope-intercept form of the line which has the smallest possible slope and is tangent to the curve  $y = 4x^3 + 12x^2$ .