



**Problem 5: Inscribing rectangles**

The figure above shows a rectangle inscribed in an isosceles right triangle whose hypotenuse is 2 units long

1. Express the y coordinate of P in terms of x  
Hint: Write the equation of line AB
2. Express the area of rectangle in terms of x
3. What is the largest area the rectangle can have and what are the dimensions?

**Problem 7: Optimal Dimensions**

You are planning to make an open rectangular box from an 8 inch by 15 inch piece of cardboard by cutting congruent squares from the corners and folding up the sides.

1. What are the dimensions of the box of largest box you can make this way?
2. What is the volume of this box

**Problem 13: Designing a Poster**

You are designing a rectangular poster to contain  $50 \text{ in}^2$  of printing with a 4 in margin at the top and bottom and a 2 inch margin at each side.

1. What overall dimensions will maximize the amount of paper used?

**Problem 15: Finding an Angle**

Two sides of a triangle have side lengths a and b and the angle between them is  $\theta$ .

1. What value of  $\theta$  will maximize the triangle's area?  
Hint:  $A = \frac{1}{2} ab \sin \theta$

Problem 25: Minimizing Average Cost

Suppose  $c(x) = x^3 - 10x^2 - 30x$  where  $x$  is measured in thousands of units.

1. Is there a production level that minimizes average cost?
2. If so what it is?