1. Find two numbers whose difference is 100 and whose product is a minimum.

2. Find the point on the line $6x + y = 9$ that is closest to the origin. Hint: minimizing distance is equivalent to minimizing distance squared!

3. A stadium curve is the curve that bounds a rectangular region with half circles at opposite ends of the rectangle; think of a running track. Find the dimensions of a stadium curve that maximize the area of the enclosed rectangle if the perimeter of the stadium curve is 440 yards.

4. A hiker is on the tundra two miles south of a road. The road runs east-west the hiker wishes to reach a point on the road 5 miles to the east. The hiker can travel at 3 mph on the tundra and 4 mph on the road. What path should the hiker take to minimize their travel time to their destination?

5. The USPS will accept a box for shipment if the sum of its length plus girth (total distance around) does not exceed 108 inches. What shape of box with a square end has maximum enclosed volume and is acceptable for shipping? You may assume that girth is measured as perimeter of the square.

6. An isosceles triangle has base 6cm and height 12cm. Find the maximum possible area of a rectangle that can be placed inside the triangle with one side on the base of the triangle.