These are exactly the examples in the printed lecture notes, just without the explanations and pictures. Please bring the complete lecture notes to class next time – there are more word problems besides these!

1. What is the largest possible product you can form from two non-negative numbers whose sum is 30?

2. Suppose the product of x and y is 26 and both x and y are positive. What is the minimum possible sum of x and y?

3. A farmer builds a rectangular pen with three parallel partitions using 500 feet of fencing. What dimensions will maximize the total area of the pen?

4. A Norman window has the shape of a rectangle capped by a semicircle. What is the length of the base of a Norman window of maximum area if the perimeter must be 10 feet?

5. Find the area of the largest rectangle with sides parallel to the coordinate axes that can be inscribed in a quarter circle of radius 10. Assume the center of the circle is located at the origin, and one corner of the rectangle is located at the origin and the opposite corner on the quarter circle.

6. Let A be the point $(0,1)$ and B be the point $(5,3)$. Find the length of the shortest path that connects points A and B if the path must touch the $x-$axis.

7. Find the area of the largest rectangle with one corner at the origin, the opposite corner in the first quadrant on the graph of the parabola $f(x)=9-x^2$, and sides parallel to the $x-$axis.

8. Find the point P in the first quadrant that lies on the hyperbola $y^2-x^2=6$ and is closest to the point $A=(2,0)$.

The steps:

1. What quantity are you trying to maximize or minimize? Write "V =" for whatever that variable is. Then stop and admire that you didn't forget the first step.
2. Now read the question, and write *any* function that measures the quantity.
3. Rewrite your function until it has only *one* independent variable.
4. **Find an interval** to use as the domain for your function.
5. Find the **global** max or min of your function on this interval. (You will either have a closed interval, and test the endpoints; or an open interval, for which we can use a sign chart of the derivative to test.)
6. Be sure you answer their question (did they want dimensions? distance? area?)