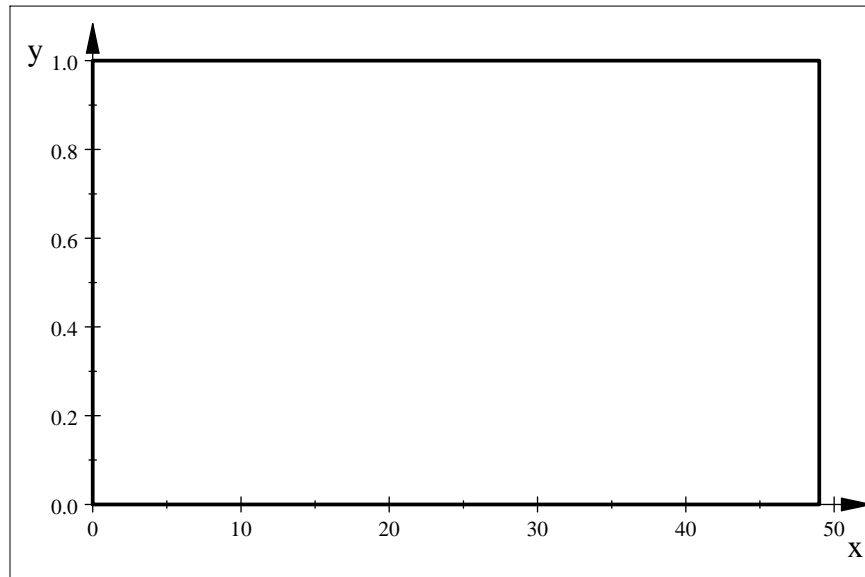# Designing a Rectangular Yard

A rectangular yard has a perimeter of 100. What is shape for largest area?

Suppose width is 1. Then length is $\frac{100-2}{2} = 49$.

$(0,0,0,1)$

$$\text{Area} = 49 \times 1 = 49$$

Suppose width is x. Then length is $\frac{100-2x}{2} = 50 - x$.

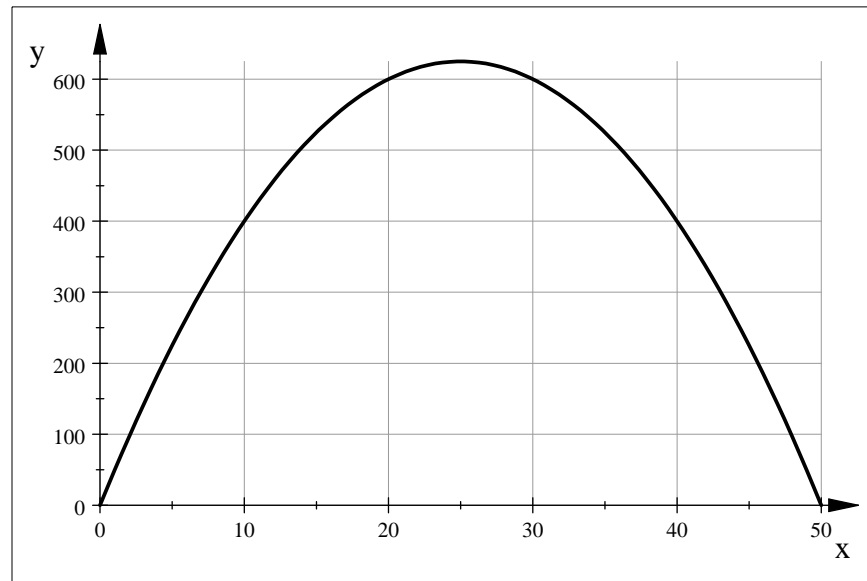Thus area in general is $x(50 - x) = 50x - x^2$

$f(x) = 50 - x$
$g(x) = 50x - x^2$
$f(1) = 49 \quad g(1) = 49 \quad f(4) = 46 \quad g(4) = 184$

$$\begin{bmatrix} x & 50-x & 50x-x^2 \\ 1 & 49 & 49 \\ 4 & 46 & 184 \\ & & \\ & & \end{bmatrix}$$

$50x - x^2$

$50x - x^2$

The parabola $y = 50x - x^2$

$25^2 = 625$

Demonstration of tangent to parabola: See Parabola Demonstrations
http://www.calculusapplets.com/derivfunc.html
See Optimization Problems
http://www2.seminolestate.edu/lvosbury/CalculusI_Folder/OptimizationProblems.htm