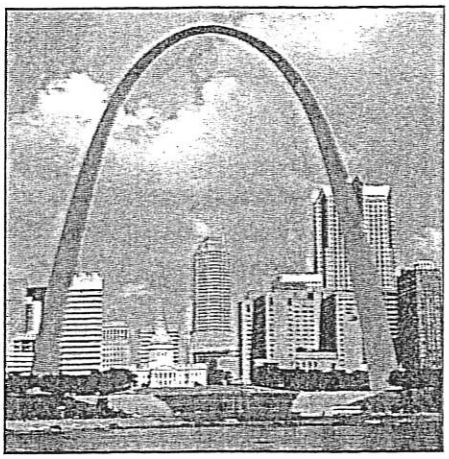
The *Gateway Arch* is the centerpiece of the St. Louis skyline. Its shape is approximately a parabola. Suppose the quadratic function describing this shape is $F(x) = -\frac{1}{70}x^2 + 6x$.

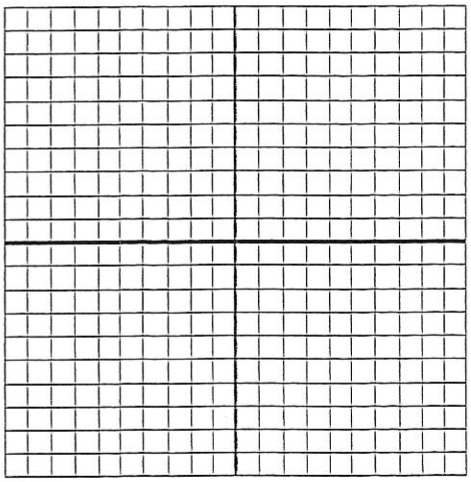


http://www.visitingdc.com/images/st-louis-arch-address.jpg

a. Find the zeros of $F(x)$.

b. Use the zeros to find the coordinates of the vertex.

c. Sketch a graph of $F(x)$. Label the zeros and the vertex with their coordinates.



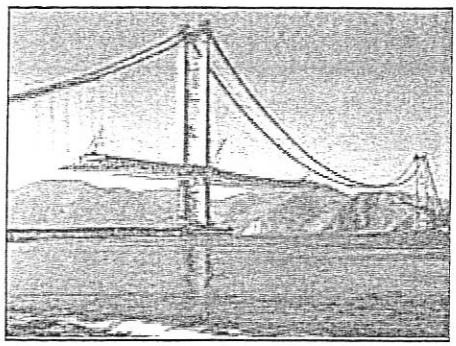
d. What is the appropriate interval of x-values for describing the Arch?

e. Check your work so far by graphing $F(x) = -\frac{1}{70}x^2 + 6x$ on your calculator (you will need to set an appropriate window), then finding the maximum on your calculator.

f. Visitors to the Arch can take a tram ride up to the top of the monument. How high above the ground is this?

In a suspension bridge such as the *Golden Gate Bridge* in San Francisco (shown under construction in the photo), the roadway is supported by cables that have approximately the shape of a parabola. Suppose that a suspension bridge cable has a shape approximated by

$f(x) = \frac{3}{5000}x^2 - \frac{3}{5}x + 200$, where $0 \le x \le 1000$.



http://goldengatebridge.org/photos/BridgeSpan.jpg

a. Find the zeros of $f(x)$, then use the zeros to find the coordinates of the vertex.

b. Find the coordinates of the vertex again using the $\frac{-b}{2a}$ formula.

c. Where are the highest and lowest points on the suspension bridge cable, and how high is the cable at each of these points?