## **Suzhou Skyscraper Shadow Problem**

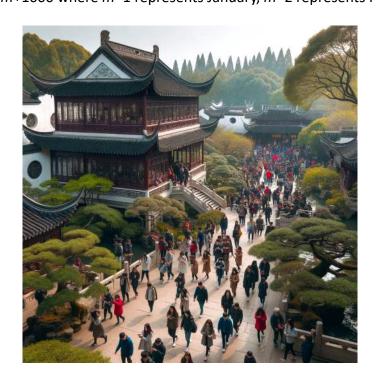
The "Gate to the East" is a prominent skyscraper in Suzhou, standing at a height of 991 ft. On a particular day, as the sun moves across the sky, the length of the shadow of the building can be modeled by the quadratic function:  $s(t)=-t^2+12t+10$  where s(t) is the length of the shadow in feet and t is the time in hours since sunrise.



- a) At what times t is the shadow length at its maximum?
- b) Determine the maximum length of the shadow.
- c) Calculate the length of the shadow 3 hours after sunrise.
- d) Using the quadratic formula, determine the times when the shadow is 40 ft long.

## **Suzhou Garden Visitor Problem**

One of Suzhou's classical gardens, the "Lingering Garden," has seen a fluctuation in the number of visitors over the past few months. The garden's management has modeled the number of visitors, v, as a function of the month, m, using the quadratic equation:  $v(m)=-30m^2+540m+1000$  where m=1 represents January, m=2 represents February, and so on.



- 1. In which month does the garden expect the maximum number of visitors?
- 2. Determine the maximum number of visitors the garden expects in a month.
- 3. Calculate the expected number of visitors in June (i.e., m=6).
- 4. Using the quadratic formula, determine in which months the garden expects exactly 2000 visitors.

## Suzhou Cultural Festival Revenue Problem

Every year, Suzhou hosts a grand cultural festival celebrating its rich history and traditions. The revenue, R, generated from ticket sales for the festival as a function of the ticket price, p, is modeled by the equation:  $R(p)=-50p^2+1000p$ 

The city council wants to determine the optimal ticket price to maximize revenue.



- 1. Express the revenue function, R(p), in the form R(p)=a(p-h)2+k by completing the square.
- 2. Using the completed square form, determine the ticket price, p, that will maximize the revenue.
- 3. Calculate the maximum possible revenue.
- 4. Interpret the results in the context of the cultural festival.