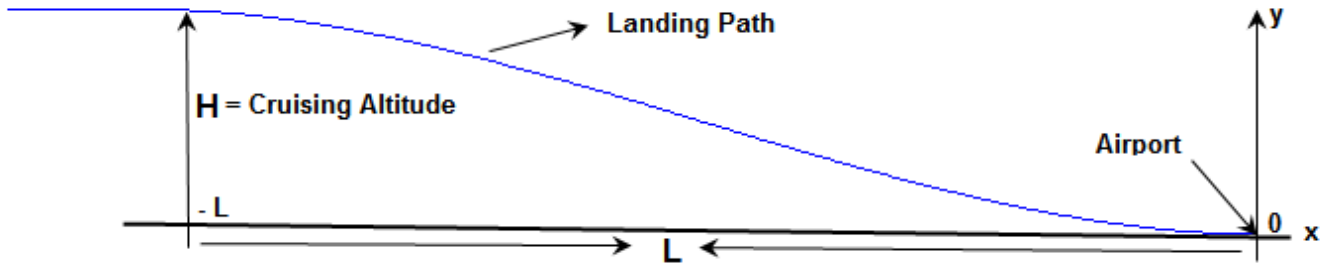


Two Modeling Problems to Solve

Airplane Landing Path

An airplane has been flying at a cruising altitude H when it begins its descent to an airport runway that is at ground level a horizontal distance L from the airplane. (See the figure.) Assume that the landing path of the plane is described by a cubic polynomial given by $y = f(x) = ax^3 + bx^2 + cx + d$, where $f(-L) = H$ and $f(0) = 0$.



- What is $f'(0)$?
- What is $f'(-L)$?
- Show that $f(x) = H \left(2 \left(\frac{x}{L} \right)^3 + 3 \left(\frac{x}{L} \right)^2 \right)$.
- Write an expression for the length of the landing path if $H = 4$ miles and $L = 25$ miles.
- Write a description of how you would compute the answer in part (d).

Age Problem

The following appeared in the book “Simple Genius” by David Baldacci (2007)

“Suppose I’m a grandfather and I have a grandson who’s about as many days old as my son is weeks old and my grandson is as many months old as I am in years. My son, grandson and I together are 140 years old. How old am I in years?”