\[ dp = -\rho g_o \, dh \]

or

\[ \frac{dp}{dt} = -\rho g_o \, \frac{dh}{dt} \]

The upward speed of the elevator is \( \frac{dh}{dt} \), which is

\[ \frac{dh}{dt} = \frac{dp}{dt} \]

At sea level, \( \rho = 1.225 \, \text{kg/m}^3 \). Also, a one-percent change in pressure per minute starting from sea level is

\[ \frac{dp}{dt} = -(1.01 \times 10^5)(0.01) = -1.01 \times 10^3 \, \text{N/m}^2 \, \text{per minute} \]

Hence

\[ \frac{dh}{dt} = \frac{-1.01 \times 10^3}{(1.225)(9.8)} = 84.1 \, \text{meter per minute} \]

3.10 From Appendix B:

At 35,500 ft: \( p = 535.89 \, \text{lb/ft}^2 \)

At 34,000 ft: \( p = 523.47 \, \text{lb/ft}^2 \)

For a pressure of 530 lb/ft\(^2\), the pressure altitude is

\[ 33,500 + 500 \left( \frac{535.89 - 530}{535.89 - 523.47} \right) = 33737 \, \text{ft} \]

The density at the altitude at which the airplane is flying is

\[ \rho = \frac{p}{RT} = \frac{530}{(1716)(390)} = 7.919 \times 10^{-4} \, \text{slug/ft}^3 \]

From Appendix B: