Problem 12.2 (Page 15)

A car starts from rest and reaches a speed of 80 ft/sec after traveling 500 feet along a straight road. Determine its constant acceleration over this distance and the time to travel the 500 feet.

\[ a = \frac{v \, dv}{ds} \]

\[ \int_{0}^{s_{00}} a \, ds = \int_{0}^{v_{0}} v \, dv \]

\[ 500 \, a = \frac{v^2}{2} \bigg|_{0}^{80} \]

\[ 500 \, a = \frac{80^2}{2} \]

\[ a = 6.4 \, \frac{ft}{s^2} \]

\[ \int_{0}^{t} 6.4 \, dt = \int_{0}^{80} a \, dv \]

\[ 6.4 \, t = 80 \]

\[ t = 12.5 \, \text{sec} \]