7.6 Const. alt. deceleration in gliding flight (ISA)

$h = \text{Const}$, $T = 0$ ($W = \text{Const}$) V_0, V_f known

$$\dot{x} = V$$
$$\dot{V} = (g/W)(-D)$$

For ISA, $D = \frac{W}{2E^*}\left(u^2 + \frac{1}{u^2}\right)$ $u = \frac{V}{V^*}$ $V^* = \text{Const.}$

$$\dot{x} = V^* u$$
$$V^* \dot{u} = -(g/W)\frac{W}{2E^*}\left(u^2 + \frac{1}{u^2}\right)$$

$$\frac{dx}{du} = -\frac{2E^* V^{*2} u}{g\left(u^2 + \frac{1}{u^2}\right)} = -\frac{2E^* V^{*2}}{g}\frac{u^3}{1+u^4}$$

$$dx = -\frac{2E^* V^{*2}}{g}\frac{u^3 du}{1+u^4} = -\frac{2E^* V^{*2}}{g}\frac{1}{4}\frac{d u^4}{1+u^4}$$

$$x_f - x_0 = -\frac{E^* V^{*2}}{2g}\ln(1+u^4)\Big|_{u_0}^{u_f}$$

$$x_f - x_0 = \frac{E^* V^{*2}}{2g}\left[\ln(1+u_0^4) - \ln(1+u_f^4)\right]$$

$$* \qquad x_f - x_0 = \frac{E^* V^{*2}}{2g}\ln\frac{1+u_0^4}{1+u_f^4}$$