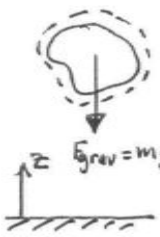
PROBLEM 2.3



$\Delta KE = -500\,ft\cdot lbf$

$\Delta PE = +1500\,ft\cdot lbf$

$V_1 = 40\,ft/s$

$z_1 = 30\,ft$

(a) $\Delta KE = \frac{1}{2} m \left[V_2^2 - V_1^2 \right]$, $m = \frac{F_{grav}}{g} = \frac{100\,lbf}{(32.2\,ft/s^2)} \left| \frac{32.2\,lb\cdot ft/s^2}{1\,lbf} \right| = 100\,lb$

Solving for V_2,

$$V_2 = \left[\frac{2\Delta KE}{m} + V_1^2 \right]^{\frac{1}{2}} = \left[\frac{2(-500\,ft\cdot lbf)}{100\,lb} \left| \frac{32.2\,lb\cdot ft/s^2}{1\,lbf} \right| + \left(40 \tfrac{ft}{s}\right)^2 \right]^{1/2}$$

$$= 35.75\,ft/s \longleftarrow$$

(b) $\Delta PE = mg(z_2 - z_1) \Rightarrow 1500\,ft\cdot lbf = 100\,lbf\,(z_2 - 30\,ft)$

($mg = F_{grav}$)

Solving,

$$z_2 = 45\,ft \longleftarrow$$