HW6-5 Soln)

The hard part here is to find Tarzan's vertical motion. Let L be the length of the vine. Set the lowest point in his swing to y = 0. Then, y_i is

$$y_i = L - L\cos\theta = 25 - 25\cos(25) = 2.34 \text{ m}$$

Then,

$$W_{TOTAL} = \Delta K + \Delta U$$

 W_{Tension} = 0 since the tension is always perpendicular to the path

Wg = conservative

Then,

$$W_{NC} = \Delta K + \Delta U$$
$$0 = \frac{1}{2}mv_{f}^{2} - \frac{1}{2}mv_{i}^{2} + \frac{1}{2}mv_{f} - \frac{1}{2}mv_{i}^{2}$$

Set lowest point as y=0

$$\frac{1}{2}mv_{f}^{2} = \frac{1}{2}mv_{i}^{2} + gmy_{i}$$
$$v_{f} = \sqrt{v_{i}^{2} + 2gy_{i}} = \sqrt{3^{2} + 2(10)2.34} = 7.47 \text{ m/s}$$