mass just touches the water. Therefore, we have

$$\omega^2 A = \frac{k}{m} A = 18.2 \text{ met/sec}^2 \Rightarrow$$

$$A = (18.2)(m/k) = \frac{(18.2)(70)}{56} = 22.75 \text{ meters}$$

Check!

Thus, we have the result

$$\boxed{z(t) = (22.75)\left[1 - \cos(\omega t)\right]}.$$

Now follow the mass in time to the time τ at which the mass has reached the height $z = 35$ meters. At this time the cord has length $(50-35) = 15$ meters, and it starts to fold.

We have

$$z(\tau) = (22.75)\left[1 - \cos(\omega\tau)\right] = 35 \Rightarrow$$

$$22.75 - (22.75)\cos(\omega\tau) = 35 \Rightarrow$$