Related Rates Examples

In each of these problems, be sure to
— Name the quantities that are changing.
— Write an equation that relates them.
— Differentiate (abstractly) with respect to time.
— Plug in and solve.

1. (20 pts.) A ladder is sliding down a wall as shown at right. If the top of the ladder is moving at \(-3\) feet per second, how fast is the angle \(\theta\) changing when the bottom of the ladder is 8 feet from the wall? (The length of the ladder does not change!)

2. A 6 foot tall man is walking uphill away from a 15 foot tall light pole. (As depicted, hopefully, at right.) If the length of his shadow is changing at 1.2 ft/s, how fast is he walking?
3. Same hill, same pole, same man, same speed. If the hill slopes up at $15^\circ$, how fast is the angle $\alpha$ changing when the shadow is 7 feet long?

4. The trough at right is filling with water at a rate of 10 ft$^3$/min. How fast is the water level rising when the water is 1 foot deep?