4.4 Introduction to Related Rates

Calculus Name: _____

CA #2

Find a relationship between the given rates of change by doing the following.

1. **Set up a relationship using variables for the situation.**
2. **Differentiate with respect to time *t*.**

1. A ladder is leaning against the wall of a house. The base of the ladder is pulled away from the wall at a constant rate.

   a. Relate the rates of change of how fast the top of the ladder and the bottom of the ladder are moving.

   b. Consider the triangle formed by the side of the house, the ladder, and the ground. Relate the rate of change of the area of the triangle with the rates the top and bottom of the ladder are moving.

2. The width of a rectangle is twice the length and both are increasing. Relate the rate of change of the length with the rate of change of the area of the rectangle.

3. A fish is reeled in from the water with the fisherman standing on a dock above the water where the end of the fishing pole is 20 feet above the water. Find the relationship between the rates of change of the angle between the line and the water along with the distance between the fisherman and the fish.

Answers to 4.4 CA #2

Variables may differ from your answers.

1a. $x\frac{dx}{dt}+y\frac{dy}{dt}=0$	1b. $\frac{dA}{dt}=\frac{1}{2}\frac{dx}{dt}y+\frac{1}{2}x\frac{dy}{dt}$	2. $\frac{dA}{dt}=4l\frac{dl}{dt}$	3. $\sec^2\theta\frac{d\theta}{dt}=-\frac{20}{x^2}\frac{dx}{dt}$