

Math 1210-2

Tuesday Oct 2

§2.8 Related rates

examples! Let's work these out together

1. draw a diagram, label the relevant functions and constants
2. convert math sentences into statements and questions about functions & derivatives
3. find equation(s) relating functions you know info for, and functions you want info about
4. take time deriv. of equation(s)
5. solve for the rates of change you want, at the instant of interest

Exercise 1 (#5 p. 140) An airplane flying west at 300 miles/hour goes over control tower at noon. A second airplane, at the same altitude, flying north at 400 miles/hour, goes over the tower an hour later. How fast is the distance between the airplanes changing at 2 p.m.?

Exercise 2 (#17 p.141)

Chris, who is 6 feet tall, is walking away from a street light pole 30 feet high, at a rate of 2 ft/sec.

(a) How fast is his shadow increasing in length when Chris is 24 feet from the pole?
30 feet " " " ?

(b) How fast is the tip of his shadow moving?

(c) To follow the tip of his shadow, at what angular rate must Chris be lifting his eyes when his shadow is 6 feet long?

Exercise 3 (#15 p.141) A light in a lighthouse 1 km offshore from a straight shoreline is rotating at 2 revolutions per minute.

How fast is the beam moving along the shoreline when it passes the point $\frac{1}{2}$ km from the point opposite the lighthouse?

Exercise 4 (example 6 p.140)

Webster city monitors the height of the water in its cylindrical water tank, with an automatic recording device. Water is constantly pumped into the tank at a rate of $2400 \text{ ft}^3/\text{hour}$. During a certain 12 hour period (beginning at midnight), the water level rose and fell according to the graph below.

If the radius of the tank is 20 ft, at what rate was water being used at 7 a.m.?

