

Math 207, Related Rates HW Name: _____

Remember:

- Draw a couple pictures, if possible, (2 “snapshots” in time).
 - Identify important quantities that are changing and label them.
 - Match the data in the problem (including the question) to the variables.
 - Find a relationship between the variables (an equation).
 - Differentiate the relationship equation with respect to the underlying common variable.
 - Plug in the values you know and solve for the value you are interested in.
1. A car leaves an intersection travelling west. Its position 4 seconds later is 20 ft from the intersection. At the same time another car leaves the same intersection heading north so that its position 4 seconds later is 28 feet from the intersection. If the speed of the cars after 4 seconds is 9 ft/sec and 11 ft/sec, respectively, find the rate at which the distance between the two cars is changing at this instant.
 2. A baseball diamond is a square 90 feet on a side. A batter hits a ball along the third base line at 100 ft/sec and runs to first base at 25 ft/sec.
 - (a) At what rate is the distance between the ball and first base changing when the ball is halfway to third base?
 - (b) At what rate is the distance between the ball and the player changing when the ball is halfway to third base?
 3. A cd company is willing to make x thousand ten packs of cds available when the wholesale price is $\$p$ per ten pack. It's known that the relationship between x and p is given by the supply equation $x^2 - 3xp + p^2 = 5$. How fast is the supply of cds changing when the price per ten pack is $\$11$, the quantity supplied is 4000 ten packs, and the wholesale price per ten pack is increasing at the rate of 10 cents per ten pack per week?
 4. A coffee pot in the form of a right circular cylinder of radius 4 inches is being filled with water flowing at a constant rate. If the water level is rising at the rate of .4 in/sec, what is the rate at which water is flowing into the coffee pot?
 5. A study prepared for the Realtors Association estimates that the number of housing starts in the Southwest, $N(t)$, (in units of a million), over the next 5 years is related to the mortgage rate $r(t)$, (percent per year), by the equation $9N^2 + r = 36$. What is the rate of change in the number of housing starts when the mortgage rate is 11% and is decreasing at a rate of 1.5% per year? (Note: the mortgage rate is given by the variable r . In this usage, “rate” doesn't mean derivative. What are the derivatives in this problem?)