

Math Xb Spring 2005

Related Rates

1 Goals

- To understand how to use a geometric relationship between two or more variables that depend on time to find a relationship between the rates of change of those variables
- To gain experience translating a verbal description of a problem into a mathematical model of the problem

2 New Terms

- Related rates

A “related rates” problem is one in which we know one rate of change and we want to find another rate of change. We frequently use implicit differentiation to solve these problems.

3 Strategy

1. Read the problem and draw a picture.
2. Name the variables. These are the quantities that are changing. (Note that usually the variables are changing with respect to time, but occasionally they are changing with respect to some other variable.)
3. Write down the rates of change that you know and the rates of change that you want to know.
4. Write down an equation that relates the variables from Step ???. You may (or may not) want to try to simplify the equation if it contains more than two variables.
5. Implicitly differentiate the equation with respect to the appropriate variable (usually time).
6. Substitute the quantities you know into the equation from Step ??.
7. Solve for any unknown variables. If there’s more than one variable left in the equation from Step ??? you may have to use other information to eliminate a variable.
8. Write down the final answer. Check: does your answer make sense?

4 References

Section 17.4 in *Calculus: An Integrated Approach to Functions and Their Rates of Change*.