

Rate of Change Functions

In this laboratory assignment you will study rates of change by looking at a set of difference quotients. You will graph these difference quotients against the x -values to approximate the rate-of-change function. Make conjectures about equations for the rate-of-change functions and test them out on the computer. You are *not* expected to come up with the exact equation for all of the problems. Some are easy; others are not. Please don't cheat by looking them up in the book.

Listed below are the functions you are going to study on StudyWorks.

$$x^3$$

$$x^4$$

$$\frac{1}{x} \quad (\text{enter as } 1 / x)$$

$$\ln(x)$$

$$e^x \quad (\text{Use the Math Palette})$$

$$\cos(x)$$

$$\tan(x)$$

1. Load the StudyWorks program. Click on *File Open My Computer Local Disk (c:) Studywks Ahlborn-Studyworks C-LAB-2.MCD*. (When you are finished, please DO NOT save the file. If you want to save your work, please use the *save-as* command and give your file a new name.)
2. For each function above:
 - a. type the function next to $f(x) :=$ on the template.
 - b. Examine the graph of f and the difference quotients q corresponding to f over this interval.
 - c. Guess a formula for the rate-of-change function and enter your guess beside $G(x) := 0$ on the template. Check your guess by looking at the StudyWorks plot with your guess and the difference quotients on the same axes. Modify your guess until you get a pretty good fit.

- d. Document any patterns you see in your guesses for the rate-of-change functions. What generalizations can you make?
3. Prepare a written report which includes each of the following:
 - a. This assignment paper as a cover to the report. Please fill in your name(s) and the date on which you are turning it in. If you had a partner but are turning in separate reports, put the partner's name in parentheses.
 - b. An introductory paragraph about the nature and purpose of the assignment.
 - c. A discussion of your results for parts 2.c. and 2.d. above
 - d. A print-out of the completed StudyWorks template showing the graph of your guess for $G(x)$ for EACH ONE of the functions assigned.