1 Writing Assignment Due Thursday, January 30

Due date. You are to submit this assignment online on Canvas by 11:59 PM on Thursday, January 30. (Effectively, this assignment is due just before midnight Thursday night.)

General instructions for writing assignments. You will have many writing assignments in this class. You can treat these as though they are entries in a math diary. What I would like to see are your honest explorations—confusions and inspirations alike—about the mathematics we are learning.

This week's prompt. We have seen how slopes of lines help us think about speed. Speed is a measure of how position changes with time. More generally, slopes help us think about how the y-coordinate changes with the x-coordinate. They tell us the *rate of change*—the rate at which y changes in terms of x.

In this writing assignment, think about other real-life situations in which one quantity may change as a function of another. Here are some examples:

1. Something's position as a function of time.

2. Money in your back account as a function of time.

3. Tidal height of water at a beach, as a function of time.[1]

4. Percentage of a segment of a population reporting happiness, as a function of the segment's income.[2]

5. Mercury levels in rain water, as a function of distance from coal power plants.[3]

You should think of your own examples, too!

In these or other examples, what units should slopes have? (In the Usain Bolt example, the units were "meters per second.") In examples, would it help to know about rates of change, or about slopes of tangent lines? What

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[1]See, for example, `http://tide-forecast.com`

[2]*High income improves evaluation of life but not emotional well-being*, Daniel Kahneman, Angus Deaton. Proceedings of the National Academy of Sciences Sep 2010, 107 (38) 16489-16493; DOI: 10.1073/pnas.1011492107

[3]See *Emissions of Hazardous Air Pollutants from Coal-fired Power Plants*, Environmental Health & Engineering, Inc.

could that tell you? What can you say about places where the slope is steepest, or shallowest, or unchanging?

You don't need to look up actual graphs, though you can if you want. Just hypothesize or explore what meaning usefulness rates of change might have.