WORDS AND PICTURES: OCTOBER 26: CALCULUS IN THE REAL WORLD

MATH 152, SECTION 55 (VIPUL NAIK)

Your name (print clearly in capital letters): _____

This is just a fun quiz.

(1) "The Reaction Time game is a game used to measure people's reaction time. When people start playing the game, their reaction time is in the 250-300ms range. We find that repeatedly playing the Reaction Time game causes the average reaction time to drop (allowing for random fluctuation as well as day-to-day variation on account of the person's physiological state). However, it does not approach zero but rather converges toward an *asymptotic* positive value of 150ms."

(2) "Our website traffic shows significant seasonal variation, with seasonal peaks during the US academic year and seasonal troughs during the summer vacation. We also have weekly periodic variation, with intra-week highs Monday - Thursday and lows Friday - Sunday. Controlling for seasonal variation, daily traffic to our website is growing by 1000 pageviews per day every year."

(3) "The instructor was sued under discrimination law because the letter grades he assigned on the test were not a *non-decreasing function* of the students' raw score on the test."

(4) "Opportunity cost and the reality of trade-offs mean that the common welfare will not be maximized if all resources are exclusively used in the production of wheat, nor if none are. Rather, the optimal amount of resources that ought to be devoted to wheat production lies in the middle. It is the middles, not the extremes, that are best for the common welfare."

(5) "The most pernicious forms of laziness and complacency arise when you are at a *local maximum* and are therefore unwilling to take a temporary dip in order to strive toward the bigger *absolute maximum*."

(6) "Every day, the daily sales at my lemonade stand go up by one, so the cumulative sales so far are a *quadratic function* of the number of days I have kept my lemonade stand open."

(7) "My Facebook friend count continues to grow, but the rate at which it is growing is steadily decreasing as I have to spend more and more time on work and less and less time on meeting new people outside my immediate friend circle."

(8) "In small quantities, enzyme C acts as a catalyst for its own creation (heard of autocatalysis?). However, once the quantity of enzyme C exceeds a certain threshold value, it acts as an inhibitor for its own creation. The biochemical reaction that produces enzyme C thus begins slowly, speeds up, and then reaches an *inflection point* after which it starts slowing down and eventually tapers off to zero. (Think of the graphs for the quantity of C produced and the rate of C produced per unit time)."