MATH 105 - SEC 001, FALL 2010. QUIZ 1

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Problem 1 (5 points)

Thomas Gross is a researcher in the Department of Cellular, Molecular and Developmental Biology here at Michigan; you may soon also know him as the guy playing the harmonica and washboard outside the UGLi (the Undergraduate Library).

A few years back, the Michigan Daily did some investigative reporting and discovered the following facts: The amount of time $G(d)$, in minutes, that Mr. Gross plays is a linear function of d (here d refers to Fahrenheit degrees). Reporters for the daily observed that Mr. Gross played for two hours and 15 minutes when the average daily temperature was 92° F and that he played for one hour when the average daily temperature was 32° F.

(1) Find a formula for $G(d)$ as a function of d when $t \geq 0$.

(2) Calculate and interpret the slope of the graph of $G(d)$. Include units.

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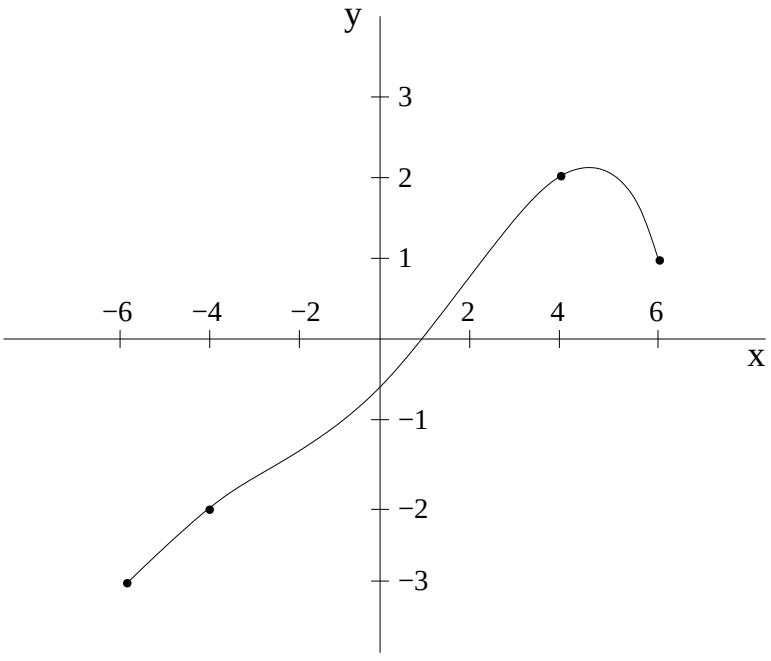
(3) Calculate and interpret $G(0)$. Include units.

(4) What is the average daily temperature on a day when Mr. Gross plays for 2 hours? Include units.

Problem 2 (4 Points)

The figure below shows the graph of the function $g(x)$.



(1) Estimate $\frac{g(6)-g(4)}{6-4}$

(2) The ratio in part (1) is the slope of a line segment joining two points in the graph. Sketch this line segment on the graph.

(3) Estimate the rate of change for this function over the interval $[-4, 4]$ ($a = -4$ and $b = 4$).

(4) On the graph, sketch the line segment whose slope is given by the ratio in part (c).

Problem 3 (5 Points)

For the following statements, decide whether they are true or false. If the statement is true, give a reason why. If it is false, provide an example where it is not true.

(1) A function must be defined by a formula.

(2) If f is a decreasing function, then the average rate of change of f on any interval is negative.

(3) The average rate of change of $f(x) = 10 - x^2$ between $x = 1$ and $x = 2$ is the ratio $\frac{10-2^2-10-1^2}{2-1}$.

(4) The following table demonstrates the relationship between two quantities P and Q

P	0	1	2	3	5
Q	5	12	0	12	1

This table shows that P is a function of Q and that Q is a function of P.

Problem 4 (2 Points)

You are looking at the graph of y, a function of x.

(1) What is the maximum number of times that the graph can intersect the y-axis? Explain.

(2) Can the graph intersect the x-axis an infinite number of times? Explain