

Problem #1. In this problem we want to find the derivative of $f(x) = \ln(x)$.

(a) (2 points) Calculate the average rate of change (abbreviated below as a.r.c.) of the function $f(x)$ in the intervals given below and fill them in the given table.

$x = \frac{1}{2}$		$x = 2$		$x = 5$	
interval	a.r.c.	interval	a.r.c.	interval	a.r.c.
[0.4, 0.6]		[1.9, 2.1]		[4.9, 5.1]	
[0.49, 0.51]		[1.99, 2.01]		[4.99, 5.01]	
[0.499, 0.501]		[1.999, 2.001]		[4.999, 5.001]	
[0.4999, 0.5001]		[1.9999, 2.0001]		[4.9999, 5.0001]	

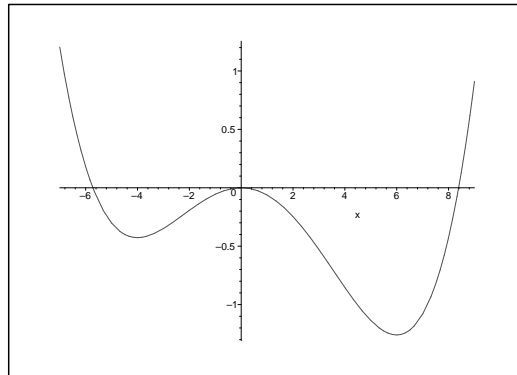
(b) (2 points) Use the data from (a) to estimate the values of $f'(x)$ (i.e. the derivative of $f(x)$) at the points $x = \frac{1}{2}$, $x = 2$ and $x = 5$. Try to write them as (irreducible) fractions.

(c) (1 point) Can you guess the value $f'(10)$? What is the function $f'(x)$?

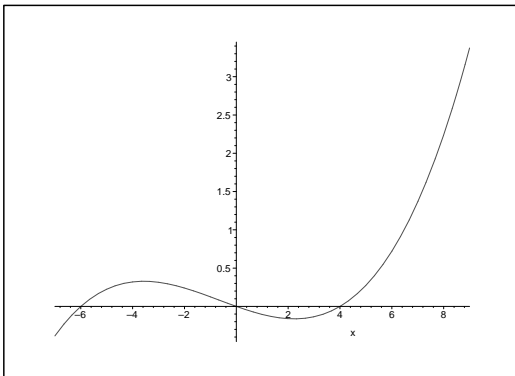
There is a second problem on the opposite side of this sheet.

Problem #2. (5 points) One of the functions $g_1(x)$, $g_2(x)$, $g_3(x)$, and $g_4(x)$ (given below) is the derivative of the function $f(x)$ (also given below). Determine which one, and *explain your reasoning*.

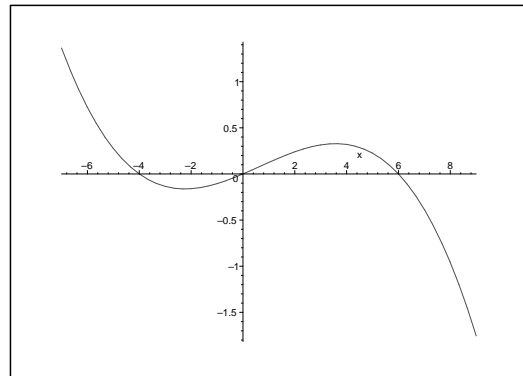
$f(x)$:



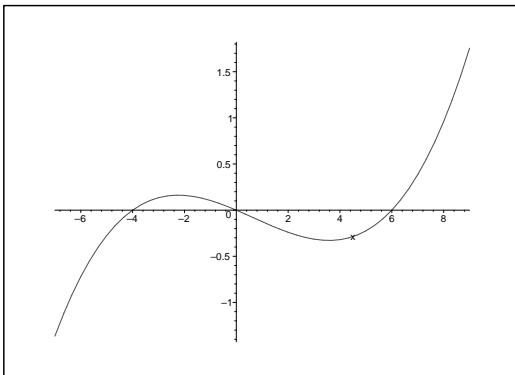
$g_1(x)$:



$g_2(x)$:



$g_3(x)$:



$g_4(x)$:

