Written Homework 1

MATH 126

Solve each of the following problems. Work out your problems on scratch paper first, then write your solutions neatly on the pages you plan to turn in. Write the problems in assigned order, with each problem clearly labeled. Use words to clearly explain your work and methods. The reader should never have to guess or infer your intentions.

Scan or photograph your solutions and submit them (as a single file) to the Written Homework 1 assignment on Moodle. This assignment is due at classtime on Wednesday, September 10.

1. Sketch the graph of a function f with the following properties. For each property, write a sentence explaining how you know that your function satisfies the property.

(a) The domain of f is the interval $[0, 10]$.

(b) $f'(4) = f'(7) = 0$

(c) $f'(x) < 0$ on the interval $(0, 4)$

(d) $f'(x) > 0$ on the intervals $(4, 7)$ and $(7, 10)$

(e) $f''(x) < 0$ on the intervals $(0, 2)$ and $(6, 7)$

(f) $f''(x) > 0$ on the intervals $(2, 6)$ and $(7, 10)$

2. Suppose that $r(-1) = 1$, $r'(-1) = 3$, $r(3) = 5$, $r'(3) = 2$, $s(3) = 0$, $s'(3) = -1$, $s(5) = 2$, and $s'(5) = 4$. Compute the following derivatives, or state what additional information you would need in order to to compute them. Explain your reasoning.

(a) $H'(3)$ if $H(x) = r(x)s(x)$

(b) $H'(3)$ if $H(x) = \sqrt{r(x)}$

(c) $H'(3)$ if $H(x) = r(s(x))$

(d) $H'(3)$ if $H(x) = s(r(x))$

3. At what values of x in the interval $0 \leq x \leq 2\pi$ does the graph of $y = \sin x + \cos x$ have a horizontal tangent? Explain clearly how you arrive at your answer.