Written Homework 1

Math 126

Solve each of the following problems. Write your solutions clearly and neatly on separate paper, explaining your reasoning with complete sentences. Submit your work either in class or in the homework mailbox (RMS level 3, near the fireplace) by 4:00pm on **Wednesday, September 11**.

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 $[-10, 10]$.

(b) f is an *even* function, meaning that $f(x) = f(-x)$.

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

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

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

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

(g) $f''(x) > 0$ 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.