Name:_____.

MATH 115 - SEC 011, WINTER 2011. QUIZ 4
TIME LIMIT: 30 MINUTES

INSTRUCTOR: GERARDO HERNÁNDEZ

Good luck!

Problem 1

(1) State the *definition* of the derivative of a function $s(t)$ at $t = a$.

(2) Suppose that the position of a track star at UM (in meters) t seconds after the start of the race is given by $s(t) = t^{\ln(t)}$. Write out the definition of $s'(1)$, and simplify as much as possible.

(3) Using your work from the previous part, estimate the value of $s'(1)$. Show your work!

Problem 2

A company's revenue from car sales, C (in thousand of dollars), is a function of the advertising expenditure, a, in tohusand of dollars, so $C = f(a)$

(a) What does the company hope is true about the sign of f'?

(b) What does the statement $f'(100) = 2$ mean in practical terms? **Include units**.

Problem 3

Let $f(t)$ be the number of centimeters of rainfall that has fallen since midnight, where t is the time in hours. Interpret the following in practical terms, giving units.

(a) $f(10) = 3.1$

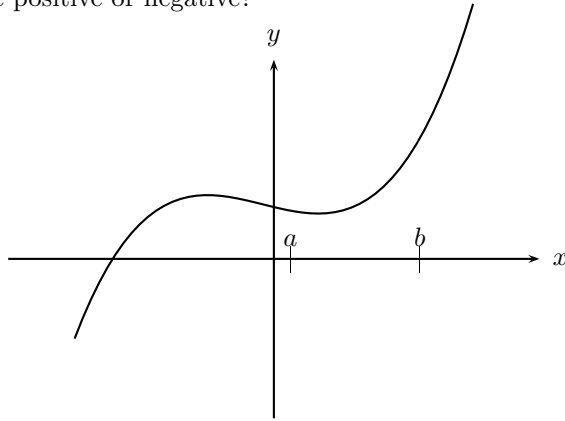(b) $f^{-1}(5) = 16$

(c) $f'(10) = 0.4$

(d) $\left(f^{-1}\right)'(5) = 2$

Problem 4

(a) Find the average rate of change of $r(x) = \frac{1}{x^2}$ on the interval $-2 \leqslant x \leqslant \pi^2$.

(b) Compute *exactly* (do not estimate!) the derivative of $r(x) = \frac{1}{x^2}$ at $x = 3$. Show your work

Problem 5

(a) Represent the number $\frac{h(b)-h(a)}{b-a}$ on the graph of $h(x)$ below, and indicate *how* it is represented. Be specific! Is this value positive or negative?

(b) Represent the number $h'(a)$ on the graph, and indicate *how* it is represented. Be specific! Is this value positive or negative?