Group Exam 1

Calculus II
Professor Johnson
Fall 2008

Name: _____
Name of group member: _____
Name of group member: _____

Problem 1: Let f be a one to one function whose *inverse* is given by the formula

$$f^{-1}(x) = x^5 + 2x^3 + 3x + 1$$

(a) Compute $f^{-1}(1)$ and $f(1)$.

(b) Compute the value of x_0 such that $f(x_0) = 1$.

(c) Compute the value of y_0 such that $f^{-1}(y_0) = 1$.

(d) Write a sentence explaining the following true statement about a one-to-one function f. *If the point (x_0, y_0) is on the graph of $f(x)$, then the point (y_0, x_0) is on the graph of f^{-1}.*

(e) Use part (d) and the graph of $f(x) = \tan(x)$ to graph the inverse function $y = \tan^{-1}(x)$ in the space provided below. Label two points on the graph of the inverse function.

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Problem 2: Prove that $\frac{d}{dx}(3x - x^2) = 3 - 2x$ using the definition of the derivative.

Explain in a sentence (and perhaps a picture) the difference between the quantities below.

$$\frac{f(x+h) - f(x)}{h} \qquad \lim_{h \to 0} \frac{f(x+h) - f(x)}{h}$$

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Problem 3: Consider the functions f and g given by the following graph:

Define $h = f \circ g$.

(a) Compute $h'(1)$.

(b) Compute $h'(6)$

(c) Are there any values where h' doesn't exist? If so, find them and explain.

(d) Calculate the derivatives below.

$\frac{d}{dx}((e\pi)^{2x})$

$\frac{d}{dx}((2x^{e\pi})$