Math 1A (7:30am – 8:20am)
Midterm 1 Version B
Tue Oct 12, 2010

NAME YOU ASKED TO BE CALLED: _____

SCORE: ___ / 150 POINTS

NO CALCULATORS OR DIFFERENTIATION SHORTCUTS (FROM CH 3) ALLOWED
SHOW PROPER CALCULUS-LEVEL ALGEBRAIC WORK AND USE PROPER NOTATION

Give the definition of "horizontal asymptote". SCORE: ___ / 6 POINTS

SEE QUIZ 3 SOLUTION

Find the equations of the horizontal asymptotes of $f(x) = \dfrac{7 - 3e^x}{\sqrt{4e^{2x} + 6}}$. SCORE: ___ / 15 POINTS

SEE VERSION A KEY

Let $f(x) = \begin{cases} x^{-1} & \text{if } x < 1 \\ x^2 - 2 & \text{if } 1 < x < 4 \\ 3x + 2 & \text{if } x > 4 \end{cases}$. SCORE: ___ / 20 POINTS

Find all discontinuities of $f(x)$ and classify each as removable, jump or infinite. Justify your answer algebraically, without using a graph.

SEE VERSION A KEY

The number of pictures you can store on your computer depends on the size of each picture. **SCORE: ___ / 15 POINTS**

Let $p = g(s)$, where p is the number of pictures (in hundreds of pictures), and s is the size of each picture (in kilobytes).

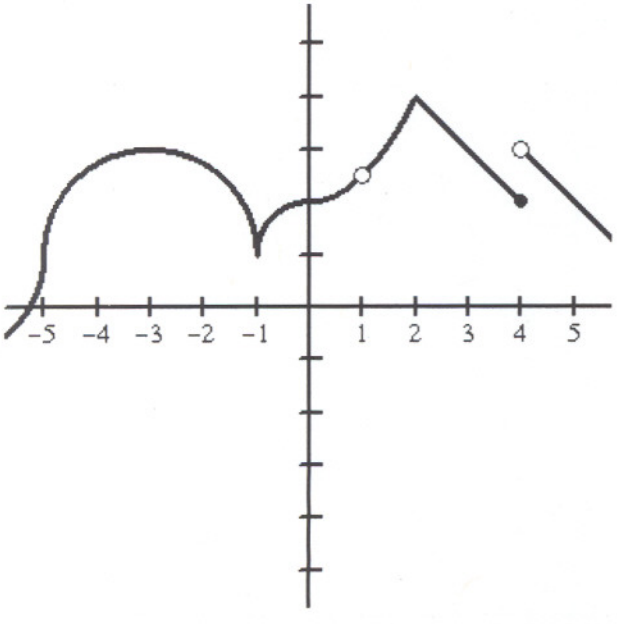
[a] What are the units of $g'(s)$? **DO NOT SIMPLIFY.**

[b] Give the practical meaning (including units) of $g'(12) = -9$.

SEE VERSION A KEY

[c] Is there a value of s_0 for which you would expect $g'(s_0) > 0$? Why or why not ?

The graph of $f(x)$ is shown below. Find all x-coordinates where $f'(x)$ is undefined, and explain briefly why. **SCORE: ___ / 10 POINTS**



SEE VERSION A KEY

Find the equations of the vertical asymptotes of $f(x) = \dfrac{1-x}{x^3 - 4x^2 + 4x}$.

SCORE: ___ / 18 POINTS

Find the values of both one-sided limits at each vertical asymptote.

When showing your "work", you may use the shorthand notation shown in class.

SEE VERSION A KEY

The position of an object (in feet) at time t minutes, is given by the function $s(t) = \dfrac{t}{\sqrt{t+6}}$.

SCORE: ___ / 18 POINTS

Find the instantaneous velocity of the object at time $t = 3$. Specify the units.

SEE VERSION A KEY

STUDENT'S CHOICE: Circle the question you want to be graded
If no question is circled, only Choice #1 will be graded

CHOICE #1:

SCORE: ___ / 12 POINTS

State both the Squeeze Theorem and the Intermediate Value Theorem.

SEE QUIZ 3 SOLUTIONS

CHOICE #2:

SCORE: ___ / 12 POINTS

One of the three statements below can be proven using the Intermediate Value Theorem (IVT).
Circle the statement that can be proven using the IVT, and write the proof.

Statement #1: $f(x) = \dfrac{x^4 - x - 1}{x^2 - 9}$ has a zero in the interval $[-2, 4]$.

Statement #2: $f(x) = \dfrac{x^4 - x - 1}{x^2 - 9}$ has a zero in the interval $[-2, 2]$.

Statement #3: $f(x) = \dfrac{x^4 - x - 1}{x^2 - 9}$ has a zero in the interval $[-2, 0]$.

SEE VERSION A KEY

Suppose you are given a graph of $y = 2x^3 - 5x^2 - 1$.

SCORE: ___ / 18 POINTS

[a] Find $\frac{dy}{dx}$.

SEE VERSION A KEY

[b] Find the equation of the tangent line to the graph above at $x = 2$.

The graph of $f(x)$ is shown below. Sketch a graph of $f'(x)$ on the same axes.

SCORE: ___ / 18 POINTS