Math 1A (9:30am – 10:20am)
Midterm 2
Tue Feb 23, 2010

SCORE: ___ / 140 POINTS

What month is your birthday ? ___ ___
What are the first 2 digits of your address ? ___ ___
What are the last 2 digits of your zip code ? ___ ___
What are the last 2 digits of your social security number ? ___ ___
[IF YOU DO NOT HAVE A SOCIAL SECURITY NUMBER, USE YOUR STUDENT ID NUMBER]

NO CALCULATORS ALLOWED
YOU MUST SHOW PROPER CALCULUS-LEVEL WORK AND LOGIC

State the definition of a horizontal asymptote.

SCORE: ___ / 0 POINTS
IF WRONG, –7 POINTS

SEE OTHER KEY

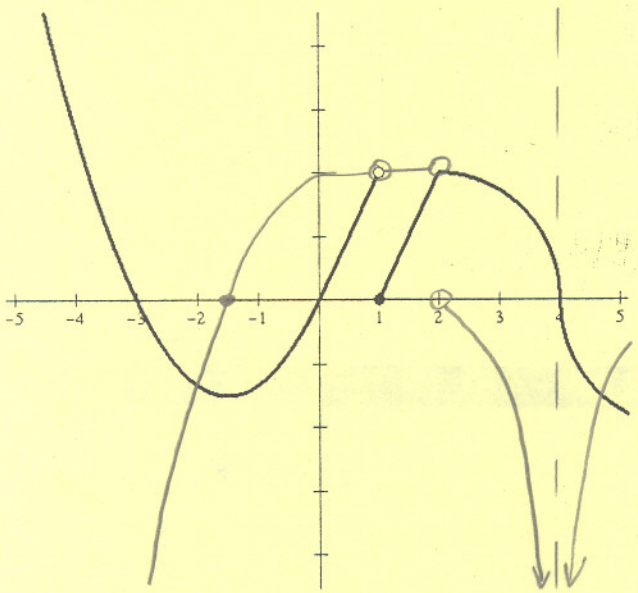
State the squeeze theorem.

SCORE: ___ / 0 POINTS
IF WRONG, –7 POINTS

SEE OTHER KEY

The graph of $f(x)$ is shown below.

SCORE: ___ / 16 POINTS



[a] Find all x-coordinates where $f'(x)$ is undefined, and explain **very briefly** why.

$x = 1$ DISCONT.
$x = 2$ CUSP
$x = 4$ VERTICAL T.L.

[b] Sketch a graph of $f'(x)$ on the same axes above.

The position of an object at time t is given by $s(t) = \ln\sqrt{1+t^2}$.

SCORE: ____ / 14 POINTS

Find the **acceleration** of the object at time $t = 2$.

SEE OTHER KEY

A television camera is positioned 3000 ft from the base of a rocket launching pad. A rocket rises vertically from the launching pad at 900 ft/s. If the camera is always aimed at the rocket, how quickly is the camera tilting upward when the rocket has risen 4000 ft?

SCORE: ____ / 16 POINTS

SEE OTHER KEY

If $g(x) = \dfrac{x^3 + 2x - 4}{\sqrt[3]{x}}$, find $g''(x)$. **SIMPLIFY YOUR ANSWER.**

SCORE: ____ / 8 POINTS

SEE OTHER KEY

The probability (p) that a flagpole will be struck by lightning depends on its height (h). If $p = f(h)$, where p is measured in percent, and h is measured in feet, give the practical meaning, including units, for the statement $f'(25) = 2$.

SCORE: ___ / 8 POINTS

A 25 FT FLAGPOLE WOULD HAVE A 2% HIGHER CHANCE OF BEING HIT BY LIGHTNING FOR EACH ADDITIONAL FOOT IN ITS HEIGHT.

Prove the derivative of $f(x) = \cos^{-1} x$.

SCORE: ____ / 14 POINTS

You may use the derivatives of any trigonometric function without reproving them.

SEE OTHER KEY

Using the definition of the derivative, prove the derivative of $f(x) = \csc x$.

SCORE: ____ / 14 POINTS

You may use the two trigonometric limits proved in class, without reproving them. You MUST NOT use any differentiation shortcuts.

SEE OTHER KEY

State the definition of e. (You may give either the definition from lecture, or the definition in section 3.6.)

SCORE: ___ / 8 POINTS

SEE OTHER KEY

Find the equation of the tangent line to the curve $2^{xy^2} = x - y$ at $(1, -1)$.

SCORE: ___ / 14 POINTS

SEE OTHER KEY

Show that $xy = a$ and $x^2 - y^2 = b$ are orthogonal trajectories (where a and b are constants).

SCORE: ___ / 14 POINTS

HINT: Do NOT try to solve for y.

SEE OTHER KEY

If $q(t) = (\tan^{-1} t)^{\sec t}$, find $q'(t)$.

SCORE: ___ / 14 POINTS

SEE OTHER KEY