Tutoring Schedule for Professors in 218 PGH:

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<th>Monday</th>
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| Prof May: 8-9,10-11am | Prof George: 12:30-2pm | Prof May: 8-9,10-11am  
Prof Constante: 11-11:45am  
Prof Sosa: 1-3pm | Prof George: 12:30-2pm | Prof Constante: 11-11:45am |

Course webpage: www.casa.uh.edu
Questions?
Examples: Find the derivative.

1. \( y = \arctan \left( \frac{2x}{3} \right) \)

2. \( f(x) = \sin^{-1}(x^2 + 1) \)
Section 4.4 - Inverse Trigonometric Functions

3. \[ y = \sin^{-1}(\ln(x)) \]

4. \[ f(x) = \cos(\arctan(\ln(x))) \]
$g(x) = \frac{\arcsin(2x)}{x}$
Find $f'(1)$ given that $f(x) = \arctan(2^x)$. 

(a) $\ln 2$

(b) $2 \ln(2)$

(c) $2$

(d) $2 \ln(2)$

(e) none of these
Compute \( \lim_{x \to \infty} \arctan(x) \).
Find the derivative of \( f(x) = (\arcsin x)^{\cos x} \)
Section 4.5 - Hyperbolic Functions

Primary definitions:

Hyperbolic cosine: \( \cosh(x) = \frac{e^x + e^{-x}}{2} \)

Hyperbolic sine: \( \sinh(x) = \frac{e^x - e^{-x}}{2} \)

Show that \( \cosh^2(x) - \sinh^2(x) = 1 \)
Section 4.5 - Hyperbolic Functions

\[ f(x) = e^x \]

\[ g(x) = e^{-x} \]

\[ \cosh(x) = \frac{e^x + e^{-x}}{2} \]

\[ \sinh(x) = \frac{e^x - e^{-x}}{2} \]
Other properties:

- $\sinh(-x) = -\sinh(x)$
- $\cosh(-x) = \cosh(x)$
- $\cosh(x) + \sinh(x) = e^x$
- $\cosh(x) - \sinh(x) = e^{-x}$
- $\frac{d}{dx} [\sinh(x)] = \cosh(x)$
- $\frac{d}{dx} [\cosh(x)] = \sinh(x)$
Section 4.5 - Hyperbolic Functions

Examples: Find the derivative.

1. \[ y = \sinh(\sqrt{x}) \]

2. \[ y = \arctan(\cosh(x)) \]
Compute \( \frac{d}{dx} \sinh^2(x) \).
Section 5.1 - Optimization

Optimization problems (to maximize or minimize):

1. Draw a picture, label it.

2. Determine the primary function (what is to be a max/min)

3. Use a secondary formula if necessary to get the primary function in terms of one variable.

4. Determine a feasible domain.

5. Find the max/min.

6. SHOW that the answer is a max/min using the First or Second Derivative test.

To maximize/minimize a function on a closed bounded interval, we evaluate the function at the endpoints, and then evaluate the function at any critical numbers in the interval.
Section 5.1 - Optimization

Examples:

1. Find the dimensions to minimize the perimeter of a rectangular garden whose area is 48 square feet.
Find the largest possible area for a rectangle with base on the $x$–axis and upper vertices on the curve $y = 4 - x^2$. 


Square corners are cut from a rectangular piece of tin that is 24 cm by 45 cm. The edges are folded up to form an open box. Find the length of the side of the square corner removed in order to have a box with a maximum volume.
Compute the slope of the normal line to the graph of \( f(x) = \ln (\arctan (e^x)) \) at \( x = 0 \).