Math 1431 - 15825

Jeff Morgan
jmorgan@math.uh.edu
651 PGH
Office Hours: 11-noon MWF

Course Homepage
http://www.math.uh.edu/~jmorgan/Math1431

Reminders:
- Test 1, Practice Test 1, Quiz 1 are all available online.
- EMCF01 was due this morning at 9am.
- EMCF02 is due on Friday morning at 9am.
- Homework 1 is posted and due next Wednesday.
- Written Quiz 1 will be given in lab/workshop on Friday.
- Purchase your Access Code NOW from the UH Bookstore, and input it on CourseWare at http://www.easa.uh.edu. Pick up your Popper Forms by the end of next week.

tinyurl.com/math1431
@morgan's Calculus

http://www.math.uh.edu/~jmorgan/Math1431

Math 1431 - 15825
Jeff Morgan jmorgan@math.uh.edu

Read the Syllabus
Access all Online Quizzes, Practice Test 1, Test 1, answer sheets for EMCFs and the Discussion Board on CourseWare at http://www.easa.uh.edu. All practice tests count as online quizzes, and all online quizzes and online tests expire at 11:59pm on the listed date.

Note: The test dates listed below are subject to change.

<table>
<thead>
<tr>
<th>Sunday</th>
<th>Monday</th>
<th>Tuesday</th>
<th>Wednesday</th>
<th>Thursday</th>
<th>Friday</th>
<th>Saturday</th>
</tr>
</thead>
<tbody>
<tr>
<td>August 27</td>
<td>Note: Video Practice Test 1, Test 1, and Online Quizzes are Open</td>
<td>Note: Test 1 is online, and homework is posted</td>
<td>Blank Slides</td>
<td>EMCF01 Due Online or in Hand</td>
<td>Homework 3 Posted</td>
<td>10</td>
</tr>
<tr>
<td>September 1</td>
<td>Labor Day Holiday</td>
<td>4</td>
<td>EMCF01 Due Online or in Hand Last day to add a class via eCASA</td>
<td>Practice Test 1 and Test 1</td>
<td>Homework 1 Due in Lab/Workshop Homework 2 Posted</td>
<td>5</td>
</tr>
</tbody>
</table>

Limits - Basic Ideas and Review

The limit of \( f(x) \) as \( x \) approaches \( a \) is given by the value (if it exists) we expect from \( f(x) \) as \( x \) approaches \( a \).

http://www.math.uh.edu/~jmorgan/Math1431

http://www.math.uh.edu/~jmorgan/Math1431
The limit of \( f(x) \) as \( x \) approaches \( a \) is \( L \) if and only if \( f(x) \) can be made arbitrarily close to \( L \) by making \( x \neq a \) sufficiently close to \( a \).

The limit of \( f(x) \) as \( x \) approaches \( a \) is \( L \) if and only if \( \lim_{x \to a} f(x) = L \).

\[
\lim_{x \to a} f(x) = L
\]

http://www.math.uh.edu/~jmorgan/Math1431

One Sided Limits, in words...

The limit of \( f(x) \) as \( x \) approaches \( a \) from the left is \( L \) if and only if \( f(x) \) can be made arbitrarily close to \( L \) by making \( x < a \) sufficiently close to \( a \).

The limit of \( f(x) \) as \( x \) approaches \( a \) from the left is \( L \), is equivalent to the notation \( \lim_{x \to a^-} f(x) = L \).

The limit of \( f(x) \) as \( x \) approaches \( a \) from the right is \( L \) if and only if \( f(x) \) can be made arbitrarily close to \( L \) by making \( x > a \) sufficiently close to \( a \).

The limit of \( f(x) \) as \( x \) approaches \( a \) from the right is \( L \), is equivalent to the notation \( \lim_{x \to a^+} f(x) = L \).

http://www.math.uh.edu/~jmorgan/Math1431

The Fundamental Relationship Between Left Hand Limits, Right Hand Limits, and Limits

\[
\lim_{x \to a^-} f(x) = L
\]

\[
\lim_{x \to a^+} f(x) = L
\]

\[
\lim_{x \to a} f(x) = L
\]

http://www.math.uh.edu/~jmorgan/Math1431
Suppose \( g(x) = \begin{cases} -x + 2, & x < 1 \\ 3, & x = 1 \\ 3x - 2, & x > 1 \end{cases} \). Find \( \lim_{x \to 0} g(x) \) and \( \lim_{x \to 0} g(x) \).

Intuitive Limits From Formulas...
\[
\lim_{x \to 2} f(x) \quad \text{where} \quad f(x) = \begin{cases} 
2x - 1 & x < 2 \\
6 - x^2 & x \geq 2 
\end{cases}
\]

\[
\lim_{x \to 1} \frac{\sqrt{x^2 + 1} - \sqrt{2}}{x - 1}
\]

**Limits Done Right!**

What does it mean to say that 
\( y \) is within \( .1 \) of \( 6 \)?

What does it mean to say that 
\( x \) is within \( .01 \) of \( 12 \), 
but not equal to \( 12 \)?
What does it mean to say that 
\( f(x) \) is within \( \varepsilon \) of \( L \)?

What does it mean to say that 
\( x \) is within \( \delta \) of \( c \), 
but not equal to \( c \)?

Let’s use this language to discuss limits...

\[
\lim_{x \to c} f(x) = L \\
\iff \\
??
\]

Give the largest \( \delta \) that works with \( \varepsilon = 1 \) for the limit

\[
\lim_{x \to 1} (1 - 2x) = 3
\]

Prove that \( \lim_{x \to 1} (1 - 2x) = 3 \).