Math 1210 Chapter 1 Homework

Date	Lecture Topic	Assignment Due
Jan 19	2.1	
Jan 22	2.2	1.6,2.1
Jan 23	2.3	
Jan 24	Help Session	
Jan 25	2.3	2.2,2.3 Part I
Jan 26	2.4	
Jan 29	2.5	2.3 Part II,2.4
Jan 30	2.6	
Jan 31	Help Session	
Feb 1	Review	2.5,2.6
Feb 2	Chapter 2 Exam	Extra Credit Review

Hw 2.1:

A. In your own words, describe what a limit basically is.

B. How is $\lim_{x\to a} f(x) = L$ read?

C. What is a one-sided limit? Why is it useful?

D. True or False? $\lim_{x\to -1} f(x)$ is the same as $\lim_{x\to 1^-} f(x)$.

Quick Check Exercise pg 110 #2

Exercises pg 110-112: 1, for #1 also find $\lim_{x\to 2} F(x)$, 4,5,8,10,11,15a

E. True or False? It is possible for $f(a)$ to be undefined and for $\lim_{x\to a} f(x)$ to exist anyway.

F. Find the following.

a. $\lim_{x\to 0^-} \frac{1}{x}$

b. $\lim_{x\to 0^+} \frac{1}{x}$

c. $\lim_{x\to 0} \frac{1}{x}$

G. Find $\lim_{x\to 0} \sin\frac{1}{x}$. Try to reason it out before using a graphing calculator.

H. Do the following:

a. Graph $g(x) = \frac{x^2-4}{x-2}$

b. Find $\lim_{x\to 2^-} g(x)$

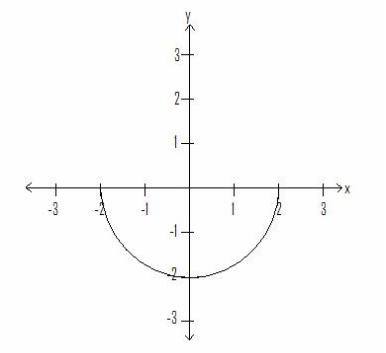
c. Find $\lim_{x\to 2^+} g(x)$

d. Find $\lim_{x\to 2} g(x)$

e. Find $g(2)$

I. What is a secant line? What is a tangent line?

J. Draw the tangent line to the graph shown at $(1, \sqrt{3})$. Draw the secant line through (-2,0) and $\left(-\sqrt{2}, -\sqrt{2}\right)$.



pg 112: 17,21acd,24

K. Fill in the blank. $\frac{0}{0}$ is not defined. However, it is sometimes possible to get a number for $\frac{almost\ 0}{almost\ 0}$, roughly speaking. For example, $\lim_{x\to 0} \frac{\sin x}{x} =$ _____.

Hw 2.2:
Quick Check Exercises pg 121: 1,3abd
Exercises pg 121-122: 1bcdeh,2abcdgh

A. In order to find $\lim_{x\to a} f(x)$, when may we simply find $f(a)$?

pg 121: 3,4,6,7,8,9,13

B. A negative number divided by a tiny negative number is what kind of number?
C. This problem will take you through the steps needed to do #15 without graphing.
   a. What do you get when you take a number slightly larger than 3 (3^+) and subtract 3?
   b. What do you get when you take a number that is 'basically' 3 (the x in the numerator) and divide by the answer you got in part a?

pg 121-122: 15-23,28,29,32,35,38,40ab

D. Evaluate $\lim_{x\to 0} \frac{\frac{1}{x}}{\frac{1}{x^2}}$

Hw 2.3 Part I:
A. A positive number divided by a large negative number is what kind of number?
B. A large positive number cubed is what kind of number?
C. A negative number minus a large negative number is what kind of number?
D. A positive number taken to the power of a large negative number is what kind of number?

Quick Check Exercises pg 130: 1,2,4
pg 131-134: 1,4,5aefg,6cdgh,7-11,14-16,18,19,22,25,30,31,33,36,37,40,42

Hw 2.3 Part II:
pg 131-134: 43,44,47,50,52,54-57,60,61,63-65,69,72,73,76,80,83

Hw 2.4:
A. What does "rigorous" mean?
B. Give the definition of $\lim_{x\to a} f(x) = L$, first exactly and then in your own words.
C. Draw a number line. Let δ be a tiny positive number. Shade the solution to $|x - 2| < \delta$.
D. Draw the x-y plane. Shade the solution to $|y - 3| < \varepsilon$, where ε is a tiny positive number.
E. Identify a, $f(x)$, and L in $\lim_{x\to 5} 3x = 15$.
F. True or False?
   a. $|a + b| = |a| + |b|$
   b. $|x - 1| = |x| - |1|$
   c. $|3y| = 3|y|$
   d. $|-3y| = -3|y|$
   e. If $|2x - 4| < 6$, then $|x - 2| < 3$.
   f. If $|x - 2| < 3$, then $|2x - 4| < 6$.
G. Manipulate $|7x + 5 - (-2)|$ to something that contains $|x - (-1)|$.
H. Manipulate $|x-(-1)| < \frac{\varepsilon}{7}$ to look like $|7x+5-(-2)| < \varepsilon$.
I. Write a paragraph or give an outline describing how to prove limits using the definition.

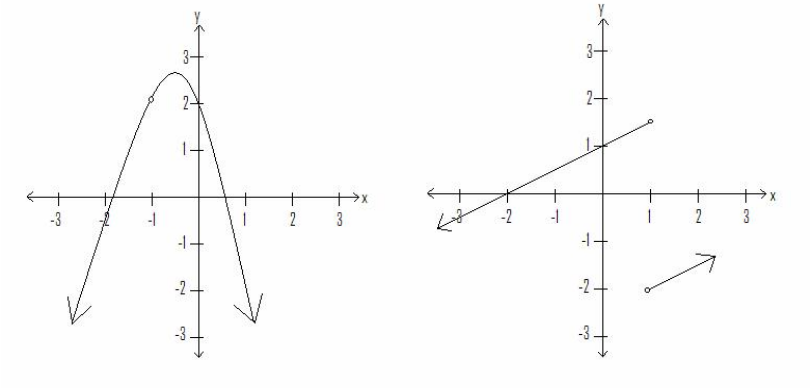
pg 140-141: 1b,3,4,7,21,22

J. Prove $\lim_{x\to 1} 6 - 2x = 4$.
K. Prove $\lim_{x\to 0} x^2 = 0$.

pg 140-141: 72,73

Hw 2.5:
Quick Check Exercises pg 152:1,2ab,3
pg 152-153: 1abcd,4abcd,5,9,10ab,11,13,14

A. What do limits have to do with continuity?
B. On pg 144, three conditions required for $f(x)$ to be continuous at a are listed.
   a. Give an example of a function that satisfies 1 & 2 but not 3.
   b. Give an example of a function that satisfies 2 but not 1.
C. Give two examples of famous functions that are continuous.
D. Give two examples of famous functions that are not continuous.
E. What's the difference between being continuous at a point and being continuous on an interval?
F. Where are polynomials continuous?
G. Where are rational functions continuous?
H. The functions shown below are defined for all x except for one value of x. If possible, define $f(x)$ at the exceptional point in a way that makes $f(x)$ continuous for all x.



pg 153: 28,29b,30ab

I. In your own words, explain what a removable discontinuity is.
J. State the Intermediate Value Theorem (IVT) first exactly and then in your own words.

Quick Check Exercises pg 152:4ab

K. Prove the function $f(x) = x^3 - 7$ has an x-intercept between 1 and 2.

pg 154: 43

L. Why does the Intermediate Value Theorem (IVT) require that f is continuous?

Hw 2.6:
Quick Check Exercises pg 159: 1abcdef,2ab(memorize part a!),3,4
pg 160-161: 1,4,6,7,17,19-24,26,28,29,30,31,35,39,41b,42b,49ac

A. Use the Squeezing Theorem to find $\lim_{x\to 0} x^2 \sin\left(\frac{1}{x^3}\right)$.

pg 161-162: 69a,71,75a,78a