

**Math 310– Fall 2009
Syllabus**

<i>Date</i>	<i>Sections</i>	<i>Homework</i>
Sept 25	1.1-1.2	
Sept 28	1.3-1.6	
Sept 30	2.1-2.4	Hmk 1
Oct 2	2.5-2.9	
Oct 5	2.10-2.11	
Oct 7	3.1-3.2	Hmk 2
Oct 9	3.3	
Oct 12	3.4-3.5	
Oct 14	4.1-4.3	Hmk 3
Oct 16	4.4-4.6	
Oct 19	Review	
Oct 21	Exam 1	Hmk 4
Oct 23	5.1-5.3	
Oct 26	5.4-5.5	
Oct 28	6.1	Hmk 5
Oct 30		Furlough
Nov 2	6.2	
Nov 4	6.3-6.4	Hmk 6
Nov 6	7.1-7.4	
Nov 9		Furlough
Nov 11		Veteran's Day
Nov 13	9.1-9.3	
Nov 16	Review	
Nov 18	Exam 2	Hmk 7
Nov 20	9.3-9.5	
Nov 23	9.6-9.7	
Nov 25		Furlough
Nov 30	8.1-8.3	
Dec 2	8.4-8.6	
Dec 4	Review	

Solutions: [Chapter 1](#), [Chapter 2](#), [Chapter 3](#), [Chapter 4](#), [Chapter 5](#), [Chapter 6](#), [Chapter 7](#), [Chapter 8](#), [Chapter 9](#), [Chapter 10](#)

Homework 1 –310

Due 9/30

p. 27: 1.4, 1.7, 1.8, 1.9, 1.10, 1.17, 1.18, 1.26, 1.28, 1.30, 1.31, 1.49, 1.52, 1.58

Question #1: Read section 2.4 in the book, in particular Example 2.6. E-mail with a thorough explanation of why each one of the expression at the top of page 40 mean the same as $P \Rightarrow Q$. Do not just copy the paragraph from the book, explain in your own words, using an example if needed. **Due 9/30**

Homework 2 –310

Due 10/7

1. p. 46: 2.1, 2.8, 2.10, 2.15, 2.17, 2.18, 2.23, 2.27, 2.31, 2.34, 2. 48, 2.54

2. Decide which of the following are equivalent:

a. $\neg (P \vee Q)$ and $\neg P \vee \neg Q$

b. $\neg (P \vee Q)$ and $\neg P \wedge \neg Q$

c. $P \rightarrow Q$ and $Q \rightarrow P$

d. $\neg (P \rightarrow Q)$ and $\neg P \rightarrow \neg Q$

3. Check that all the valid arguments below are tautologies:

$$((p \rightarrow q) \wedge \neg q) \rightarrow \neg p$$

$$p \rightarrow (p \vee q)$$

$$(\neg p \wedge (p \vee q)) \rightarrow q$$

$$((p \rightarrow r) \wedge (q \rightarrow r)) \leftrightarrow ((p \vee q) \rightarrow r)$$

Question #2: Read result 3.2 on page 69. Explain how come the implication is true, even though $x^3 \geq 8$ is not always true (for example if $x = 1$). Construct your own example illustrating the same concept (be creative, don't use the same exact type of statements!).

Homework 3 –310

Due 10/14

1. p. 83: 3.1, 3.2, 3.7, 3.12, 3.14, 3.24, 3.27, 3.37, 3.41, 3.43, 3.47

2. Negate:

a. Whenever a function is differentiable, it is continuous.

b. A continuous function must be integrable.

c. A prime number greater than 2 can't be even.

d. A nonnegative number necessarily has a square root.

e. A one-to-one function has an inverse function.

f. b divides 5 only if b divides 10.

g. A sequence is bounded whenever it is convergent.

- h. No shoes, no shirt, no service!
- i. If f has a relative maximum at c and if f is differentiable at c , then $f'(c)=0$.
- j. $|x| < 2$ if and only if $-2 < x < 2$.
- k. It is necessary for a sequence to be bounded in order to be convergent.

3. Finish worksheets 3 and 4.

Question #3: Read definition e. on the handout with definitions. Think about how you might define the Lowest upper bound (supremum) of a set S of real numbers. Write the definition and its negation.

Homework 4 –310
Due 10/21

- 1. p. 101: 4.2, 4.7, 4.10, 4.12, 4.20, 4.21
- 2. Do all probs. from worksheets 5 and 6 that we have not don in class.

Question #4: Read the proof of DeMorgan's Law 4a on page 100. After you're sure you understood it, prove the other DeMorgan Law, 4b

Homework 5 –310
Due 10/28

p. 103: 4.29, 4.30, 4.37, 4.39, 4.40, 4.44, 4.45, 4.58, 4.59, 4.61, 4.66

p. 124: 5.4, 5.8, 5.16, 5.17, 5.18, 5.20, 5.23

Question #5: Read the intermediate value theorem, as stated on p.120. Compare with the statement in your calc book. Write a proof of the theorem (you may get inspiration from your calc book or any other source). Negate the statement of the theorem.

Homework 6 –310
Due 11/6

Worksheet 9: 8, 11, 13, **Worksheet 10:** 2, 7, 8, 9, 10, 11, 12

Question #6: Read about induction at:
http://en.wikipedia.org/wiki/Mathematical_induction

Explain how is induction similar to the domino principle (and what is the domino principle, anyway?)

Homework 7 –310
Due 11/18

p. 150: 6.1, 6.5, 6.13, 6.14, 6.18, 6.20, 6.22, 6.30, 6.33, 6.36, 6.38, 6.49, 6.50,
6.51

Question #7: Due 11/13 Read the principle of strong mathematical induction, p. 147, and the examples that follow. Explain the principle and explain what the difference is between it and the regular induction.