**W01- First Day Writing Assignment** (September 9-16)

On the 1st day of classes you will consider a mathematic problem involving positive integers $n$.

a) Describe the question under consideration in your own words. Be concise yet complete.

b) Provide the analysis of the problem for the first several relevant values of $n$.

c) Discuss any patterns that emerge. Do these patterns continue for larger $n$? For all appropriate $n$? Give rationale, proofs or counterexamples, as appropriate.

Work individually (not in groups). Present your work on one two-sided sheet of paper. If you find that you need more space, prepare the best one sheet (2 sides) presentation you can muster. Your write-up is due on Wednesday, September 16.

**W02-Second Writing Assignment: exponential vs. polynomial growth** (September 18-25)

Reinterpret and rewrite the plausibility argument given in class, purportedly showing that the exponential growth in the number of regions is 'unsustainable'. Be sure to define all appropriate terms, such as edge, secant or chord, exponential growth, etc. You may discuss the ideas of the argument with others, but the final writing should be composed from scratch by you alone.

**W03-Third Writing Assignment: prime gaps** (September 25-32)

"There are arbitrarily large gaps between primes."

Take the statement above and reinterpret it using more formal language, including quantifiers. Using ideas from the class discussion, prove the statement. In addition, look up the recent (Spring 2013) breakthrough by Yitang "Tom" Zhang involving prime numbers and state his result in a phrase similar in style to the informal one below. Explain why the two statements do not contradict one another. A good reference for Yitang Zhang's result is Quanta Magazine; see the URLs below (and look for phrases such as "No matter how far you go..." or "no matter how sparse..." as you enjoy the entire article). You may discuss the ideas of the argument with others, but the final writing should be composed from scratch by you alone.


You may also enjoy these related articles:
https://www.quantamagazine.org/20150402-prime-proof-zhang-interview/

**Homework exercises guide and Calendar**

(See the suggested book homework problems on the course web page. Below is preliminary list of suggested problems and readings. Problems will not be collected but may be discussed and quiz problems may be similar to book exercise problems.)

**Week 1 (Sept. 9-16)**
1.1 (Deductive Reasoning, Logical Connectives): 1, 3-6.
1.2 (Truth Tables): 1, 3-4, 8-11, 14-16, 18.
1.3 (Variables and Sets): 1, 3-4, 7.
1.4 (Operations on Set): 1, 5-12.
1.5 (Conditionals and Biconditionals): 1, 4-9.

**Week 2 (Sept. 18-25)**
2.1 (Quantifiers): 1, 3-5, 7-9.
2.2 (Equivalence Among Quantifiers): 1, 3-5, 7-9.

**Week 3 (Sept. 25-32)**
3.1 (Proof Strategies): 1-4, 8-10, 14-16.
3.2 (Negations, Conditionals): 1-4, 6-8, 11-12.
3.3 (Quantifiers) 1-6, 13-16, 20-23, 26.