Nebraska Wesleyan University
Math 4980: Senior Seminar
Spring 02019

Readings and Exercises

Updated February 20, 2019

January 23

Section 2.1, 2.2, 3.1

- No pre-class assignment.

January 25

Section 3.2, 3.3

- Read the definition of "strings" in the first paragraph of Section 3.2. List all sixteen 2-digit strings over the alphabet $\{1, 2, 3, 4\}$.
- Read Theorem 3.6 and its proof. Try to use the reasoning of the proof to explain why there are sixteen strings over the alphabet $\{1, 2, 3, 4\}$.
- Read Theorem 3.14 and its proof. Try to use the reasoning of the proof to explain why there are twelve strings over the alphabet $\{1, 2, 3, 4\}$ that do not repeat a digit.
- Read Definition 3.15. List all six 2-element subsets of the set $\{1, 2, 3, 4\}$.
- Read Theorem 3.16 and its proof. Try to use the reasoning of the proof to explain why there are six subsets of the set $\{1, 2, 3, 4\}$. (Compare to the 2-digit strings over the alphabet $\{1, 2, 3, 4\}$ that do not repeat a digit.)

January 30

Section 3.2, 3.3

- Read Definition 3.8, Definition 3.9, Proposition 3.10, and Example 3.11.
- Write out all 3-digit binary strings along with the corresponding subsets of $\{1, 2, 3\}$ under the bijection described in Example 3.11.

February 1

Section 4.1, 4.2

- Read Theorem 4.1 and its proof.
- Explain how each of the binomial coefficients is appearing in the expansion of $(x + y)^4$. (For example, why is $\binom{4}{1}$ the correct coefficient for xy^3?)

February 6

Homework Session

Meet to work collaborate on Homework 1 problems.

February 8

Section 5.1, 5.2

No reading for today.

February 13

Section 5.3, 7.1

- Read Examples 7.1 and 7.2 along with their solutions. In your own words, explain what is going on with the alternating addition and subtraction.
- Read the statement of Theorem 7.3. Write the summation out in full for the the $n = 2$ and $n = 3$. Compare this with Examples 7.1 and 7.2.

February 15

Section 7.2

No reading for today.

February 20

Class cancelled.

February 22

Section 9.1

You'll notice I am moving back and forth through this section. This is intentional.

- Read the definition of a graph and the definition of degree.
- Read the definition of a connected graph. Draw an example of a disconnected graph.
- Draw an example of a connected graph on six vertices in which every vertex has degree 3.
- Skip to Theorem 9.4 and its proof. What are e and the d_i in the context of your example from the previous item? According to the theorem, is it possible to draw a graph on seven vertices in which every vertex has degree 3?
- Return to the sequence of short definitions leading up to closed Eulerian trail. Does the graph in Figure 9.2 appear to have a closed Eulerian trail? (Show a couple attempts at producing one.)
- Read the statement of Theorem 9.2. According to the theorem, does the graph in Figure 9.2 have a closed Eulerian trail?