

Instruction.

- Submit your homework by email (subject line: Math3250 Combinatorics Reading HW 12).
- Your answers don't require math symbols beyond letters and numbers, so you can type your answers in the body of an email or in a word editor.
- You can also complete by hand (then scan using your smart phone to produce a PDF file) or in L^AT_EX.
- Ref: textbook *Combinatorics and Graph Theory* by Harris, Hirst, and Mossinghoff (HHM) Sec 1.1.1–1.1.2 and Bóna's "A Walk through Combinatorics" textbook, Chapter 9

1. GOOD WILL HUNTING

Watch [The problem in Good Will Hunting - Numberphile](#) (5 mins). Answer: What problem is explained in the video?

2. WATCH OR READ: SEC 1.1.1–1.1.2, P. 1–8 OF HHM

Get *Combinatorics & Graph Theory* by Harris, Hirst, & Mossinghoff (HHM) from HuskyCT: Graph Theory textbook. Do one of the following:

- Watch lecture video of Sec 1.1.1 and 1.1.2 (part A and B)
- Read only the parts highlighted in color [lecture notes for Sec 1.1.1 and 1.1.2 video](#)
- Read Sec 1.1.1–1.1.2 of HHM, p. 1–8, but focus on the vocab words highlighted in the videos/lecture notes.

Write down which option you did. If you watched the video, please specify (Kaltura or YouTube) and what type of device.

3. HHM SEC 1.1.2 EXERCISES

Attempt two or more of the following exercises from the textbook *Combinatorics and Graph Theory* by Harris, Hirst, and Mossinghoff (HHM) from HuskyCT.

HHM Sec 1.1.2, p.9: Exercise 1. (maximum number of edges in a graph on n vertices)

HHM Sec 1.1.2, p.9: Exercise 2. (degree sequence having at least a pair of repeated entries)

HHM Sec 1.1.2, p.9: Exercise 3a,b. (how many paths, i.e. walks with no repeated vertices?)

HHM Sec 1.1.2, p.9: Exercise 3c,d. (how many circuits, i.e. closed trails, distinct edges?)

4. BÓNA CH 9 EXERCISES

Complete three or more of the following exercises from Bóna's textbook. There are brief solutions to the exercises at the back of the chapter, so you can at least copy the book's solutions. You should include more details in your proofs.

Bona Ch 9, p.219: Exercise 1. (make all streets one-way so that you can never return to a point you have left) Go to the end of the chapter for a brief solution.

Bona Ch 9, p.219: Exercise 3. (about the simple graph on 10 vertices) Go to the end of the chapter for a brief solution.

Bona Ch 9, p.219: Exercise 4. (about the simple graph on 9 vertices) Go to the end of the chapter for a brief solution.

Bona Ch 9, p.220: Exercise 7. (the number of possible simple graphs with n vertices) Go to the end of the chapter for a brief solution.

Bona Ch 9, p.220: Exercise 10. (the number of people having an odd number of siblings is even) Apply the "First Theorem of Graph Theory" of HHM. Go to the end of the chapter for a brief solution.

5. PRESENTATIONS

Pick any two of the nine exercises listed above, and prepare to explain your attempts during class meeting on Tuesday, March 31.

It's fine (and maybe better for you) if you pick questions that you don't feel 100% about.

You are welcome to send me your solution before class meeting so that I can set it up ahead of time (so that you only need to speak and not worry about your camera setting).

6. MISCELLANEOUS

- Approximately how much time did you spend on this homework (including reading or watching the videos)?
- You are encouraged to communicate with your classmates. Write down the resources (for example, a textbook or a math.stackexchange.com/ page) you referenced and the people that you talked with.
- What can I do to improve your remote learning experience? Questions or other comments?