Midterm

Math 141

Due Friday, February 24, 2023 by 5pm

This midterm is an opportunity for you to show what you've learned in this course so far. Please justify your answers. The exam is not meant to have any tricks or surprises. Please read everything carefully, including the instructions.

Instructions:

- Solutions must be submitted on Gradescope by Friday at 5pm. Solve as many problems as you can.
- **You may use the book and your lecture notes. You may not use any other resources. You must work by yourself.**
- You may either submit handwritten or typed solutions (please make your own tex file). If you write by hand, please try to be neat.
- **Please include a page with your name, and the following academic honesty statement:** "I affirm that I have completed this exam without using any outside resources and that the work I am submitting is my own."
- If you have any questions, please ask. Good luck!

Problem	Points	Possible
1		5
2		5
3		5
4		5
5		5
Total		25

Please try to keep your solutions short and to the point.

If you have questions about any problem statement, please ask on Campuswire (you can ask privately directly to me).

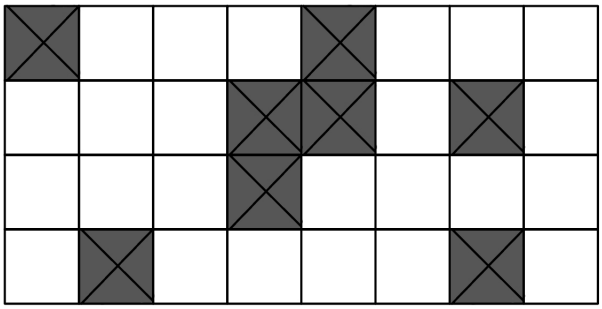
Problem 1. Let G be a connected, bipartite graph. Compute $\chi(G, 2)$ with proof.

Problem 2. What is the most edges possible for an 11-vertex graph with chromatic number 3. (The answer should be a number, together with an explanation.)

Problem 3. Prove that $M_{2,2,2,2}$ is not planar.

Problem 4. Is it possible to walk through Providence starting and ending at the same place and crossing every bridge exactly once? (Type "Providence, RI" into Google maps[1] to see the city limits. Also you're walking, so ignore the highways.)

Problem 5. Determine if the following board can be tiled by 1×2 and 2×1 tiles. The black squares are *not* allowed to be used. Solve this by translating the problem to a graph theory problem and solving the graph theory problem.



[1] You can use this outside resource, but no others!