

ASSIGNMENT 11 (DUE ON 24 OCTOBER 2025)

MATH2301, SEMESTER 2, 2025

1. GENERAL REMARKS

- (1) The assignment is due on gradescope.
- (2) Please read the academic integrity policy for assignments. Remember that if you want an extension, you must ask at least 24 hours ahead of the deadline.
- (3) The words “show” and “prove” are synonyms. You may not be used to writing formal mathematical proofs, which is OK. Write a justification in plain language that would convince the reader.
- (4) If you are having trouble with any of the points, come and discuss with me in office hours. It is part of my job to help you understand this stuff, so please use my time!

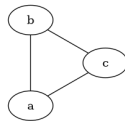
2. PROBLEMS

This is a short assignment because it is the final week, and you probably have many other things to do.

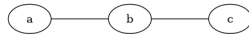
In the game Chomp-the-graph(G), we start with a finite undirected graph G . Two players take turns removing either a vertex or an edge of G . When a vertex is removed, all edges adjacent to it are automatically removed. When an edge is removed, no other vertices (or edges) are removed. As usual, the player who cannot make a move loses.

Find the Grundy value of Chomp-the-graph(G) for the following G .

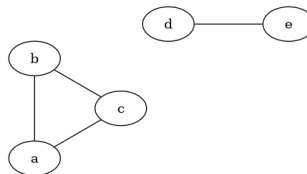
(1)



(2)



(3)



Using the Grundy values, find all the winning moves for the first player.

- (4) (Food for thought; not to be turned in) Can you spot any patterns in Chomp-the-graph(G) for various G ? For example, if G is a chain of n vertices, what is the Grundy value? What about other kinds of graphs?
- (5) (Food for thought; not to be turned in) Write a computer program that takes a graph G as input and computes the Grundy value of Chomp-the-graph(G).