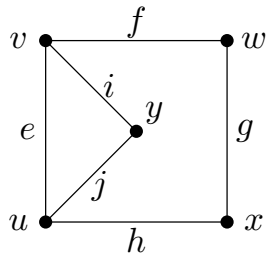
MATH 213 – DISCRETE MATH – Fall 2024 – Quiz 8 – Wednesday, Nov. 13

This quiz contains 3 questions – You have 15 minutes

Name: _____

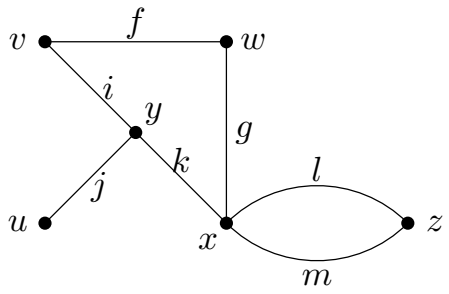
Problem 1. Write the incidence matrix for the following graph.



Solution: We order the rows as u, v, w, x, y, and the columns as e, f, g, h, i, j. Then the incidence matrix is

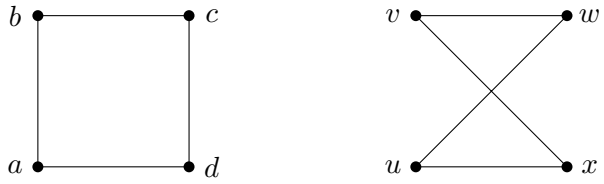
$$\begin{bmatrix} 1 & 0 & 0 & 1 & 0 & 1 \\ 1 & 1 & 0 & 0 & 1 & 0 \\ 0 & 1 & 1 & 0 & 0 & 0 \\ 0 & 0 & 1 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 1 \end{bmatrix}.$$

Problem 2. For the following graph, find all the cut-vertices and cut-edges (*no work needed*).



Solution: The cut vertices are y and x. The only cut edge is j.

Problem 3. Consider the following pair of graphs.



For the following functions, explain why they aren't isomorphisms (which specific condition(s) do they violate).

(a) $f(a) = u, f(b) = v, f(c) = w, f(d) = x$
Solution: a and b are adjacent on the left graph, but $f(a) = u$ and $f(b) = v$ are not adjacent on the right graph (several other examples possible).

(b) $f(a) = u, f(b) = w, f(c) = u, f(d) = x$
Solution: f is not a bijection since $f(a) = f(c) = u$.