Name: ________________
MATH55 Section ___
Homework 13
Due Tue. 4/2

47.7 Imagine creating a map on your computer screen. This map wraps around the screen in the following way. A line that moves off the right side of the screen instantly reappears at the corresponding position on the left. Similarly, a line that drops off the bottom of the screen instantly reappears at the corresponding position at the top. Thus it is possible to have a country on this map that has a little section on the left and another little section on the right of the screen, but is still in one piece.

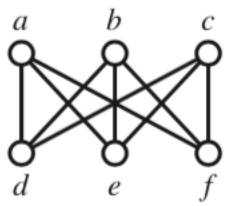
Devise such a computer-screen map that requires more than four colors.
Try to create such a map that requires seven colors! (It is possible.)

47.12 Recall the university examination-scheduling problem. Create a list of courses and students such that more than four final examination periods are required.

47.17 Let G be an r-regular graph with n vertices and m edges. Find (and prove) a simple algebraic relation between r, n, and m.

47.21 (d,e) What does it mean for two graphs to be the same? Let G and H be graphs. We say that G is isomorphic to H provided there is a bijection $f : V(G) \to V(H)$ such that for all $a, b \in V(G)$ we have a b (in G) if and only if $f(a)$ $f(b)$ (in H). The function f is called an isomorphism of G to H. We can think of f as renaming the vertices of G with the names of the vertices in H in a way that preserves adjacency. Less formally, isomorphic graphs have the same drawing (except for the names of the vertices).

d. Give an example of two graphs that have the same number of vertices and the same number of edges but that are not isomorphic.



e. Let G be the graph whose vertex set is $\{1, 2, 3, 4, 5, 6\}$. In this graph, there is an edge from v to w if and only if $v - w$ is odd. Let H be the graph in the figure. Find an isomorphism $f : V(G) \to V(H)$.