CMSC 15100 Introduction to Computer Science I
Homework 12

Your answers should be saved in a .rkt file and submitted via Canvas before the start of the next lecture. At the top of the file for this assignment include a comment,

```
;; Homework 12
;;
;; your name
;; your CNET id
;; your collaborators
```

For this homework, some parts require you to explain things in English. For these questions, write your answers in a Racket comment box, which you can create by clicking on the "Insert" tab at the top of DrRacket.

If your code doesn't compile, it may not be graded. Please double check to make sure your code runs before submitting!

Problems

1. (13 points) It's a natural question: are you a friend-of-a-friend-of-a-friend-of-a-friend of a billionaire? To answer this question, we represent immediate friendships between people by a `Graph`, and we represent how much money everyone has in dollars by a `(Vectorof Exact-Rational)`. In the vector, the 0-th entry represents the money owned by vertex 0, the 1-th entry is the money owned by vertex 1, and so on.

   Your goal is to find, given a person (vertex) of the graph, which reachable person (vertex) in the graph has the most money?

   ```
   (: richest-connection : Graph (Vector Exact-Rational) Vertex -> Vertex)
   ```

   Your code for this problem should use the `dfs!` function we wrote in class.

   The `Graph` type currently doesn't allow us to name vertices anything other than numbers, unfortunately. When you write tests for this problem, create a `Graph` of connections, create a `(Vectorof Exact-Rational)` storing how much money everyone has, and then write a comment for each vertex of the graph with the person's name. Your tests can be `check-expect` calls for different vertices in the graph.
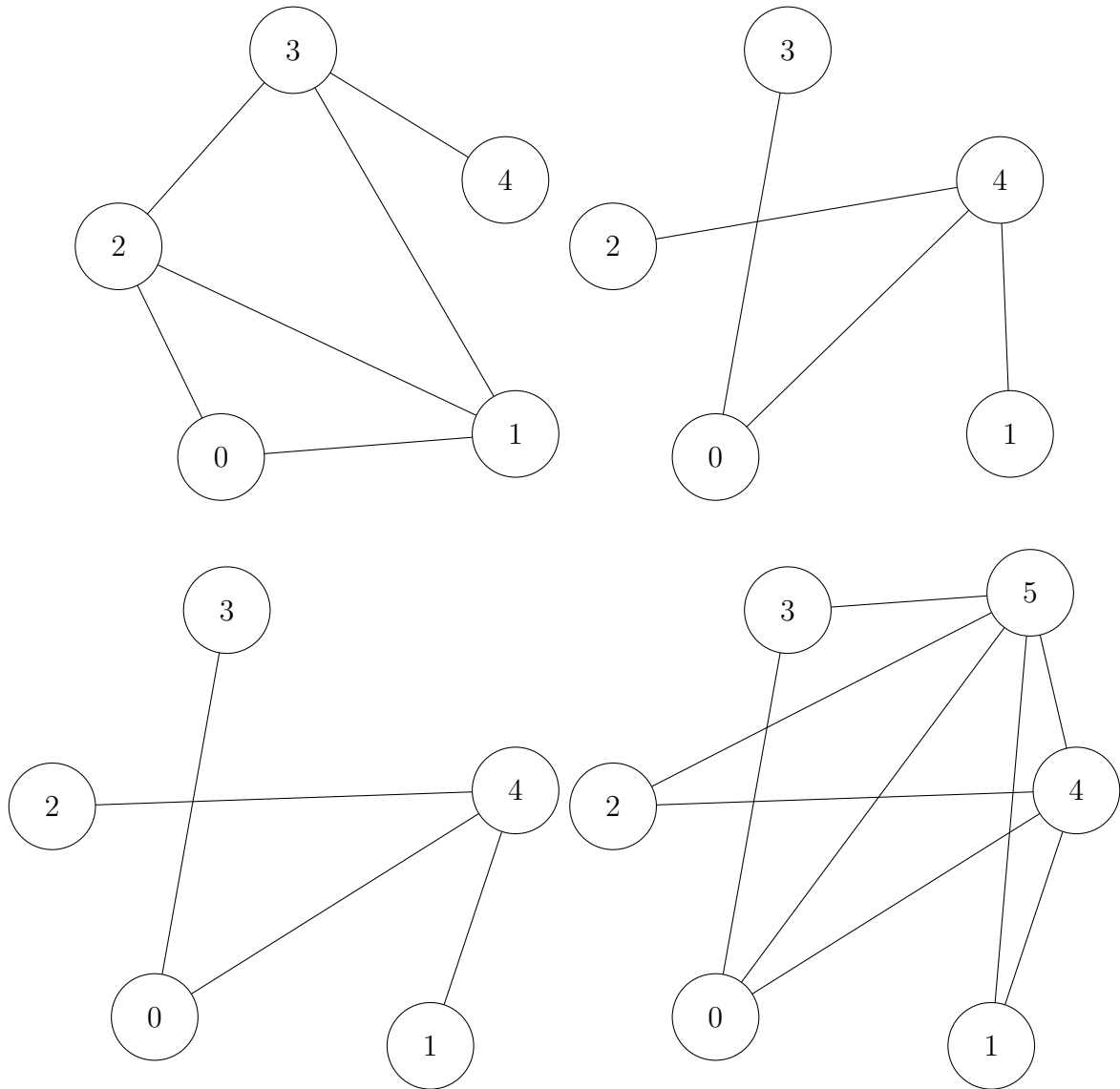
2. (5 points) Write a recursive implementation of the function `andmap`. You should name your function `my-andmap` and it should be of polymorphic type.

3. (5 points) Write a recursive function to count how many ways are there to cover a floor of size $2 \times n$ with tiles of size 2×2 and 1×2.