1. CLRS Exercise 20.2-5
2. CLRS Exercise 20.4-1

3. Suppose that you start with an arbitrary forest of “up trees,” containing $n$ nodes altogether. These trees are not necessarily balanced at all. You then perform $m$ find operations, using path compression. Show that executing these find operations takes time $O(n + m)$.

4. Show that without path compression, but with size balancing, performing $m$ union/find operations on $n$ nodes takes time $\Omega(m \log n)$ in the worst case. That is, specify inputs that cause the algorithm to run for at least this long.

5. CLRS Exercise 22.4-2
6. CLRS Exercise 22.4-5

7. CLRS Exercise 22.3-12. Hint: there is a fairly simple algorithm that runs in time $O(|V|(|V| + |E|))$. Make sure you carefully justify the correctness of your algorithm.