**CSCI 2270**

**Review for final exam. All 3 previous review sheets are also important.**

**Given the graph with vertices A, B, C, D, E, and F, and the following edges:**

**A: F, B**

**B: A, C C: B, D**

**D: C, E**

**E: D, F**

**F: E, A**

1. **Draw the graph as vertices and edges.**

1. **In a depth first search of the above graph, what vertices will it pop off the stack in a search starting at A and ending at F?**

1. **In a breadth first search of the above graph, what vertices will it pop off the queue in a search starting at C and ending at D?**

1. **What’s better about breadth first search than depth first search?**

1. **Which takes longer, breadth first or depth first search?**

1. **Given a hash table of size 17 (this tells you the hash function to use) that uses open addressing plus a search for the next open slot, add the pairs:**

**138, “Frodo”**

**241, “Pippin”**

**070, “Merry”**

**104, “Tom Bombadil”**

**106, “Dick Cheney”**

**Draw the final table when you are done.**

**What problem is getting worse here?**

**How would your answer change if you used double hashing with a second hash function of modulo 5?**

**How would your answer change if you used chained hashing?**

1. **Explain, in simple English, how a buffer overrun hack works.**

1. **What is the difference between a deep copy and a shallow copy? How can you write a test to tell which one you have? How do pointers and shallow copies relate to each other?**

1. **How can you tell if 2 heaps in array form have all of the same elements?** 
   1. Check to see if the heaps have the same size, then check the root element for equality, remove it, re-heapify, then repeat until the end of the heaps are reached or until two roots are found to be different

1. **Why do big\_numbers benefit from a trim() function? When is such a function useful in HW2?**

1. **If we didn’t write big\_number’s operator =, but we used the default version that C++ gives us instead, will we leak memory?**

1. **Give me an example of the scenario in question 11 causing a crash at runtime.**

1. **Why do we have the rule that heaps must be complete trees?**

1. **Given the array 1 4 6 8 3 2 7 5 9 0, show me how quicksort could degrade to quadratic performance in the first 3 partition steps.**

1. **Given a load factor of 25%, what is the general performance (in terms of expected slots checked) of a doubly-hashed hash table?**

1. **When can a load factor exceed 100%? Why does this happen?** 
   1. Using a value of a linked list or array associated to a key give you the ability to store a load factor greater than 100%