Assignment 8.1

1. a) O(n), where n is the amount of people at the party
b) O(n^2), where n is the amount of people at the party
c) O(n), where n is the amount of steps in the flight of stairs
d) O(1)
e) O(1)
f) O(n), where n is the number of levels in the building
g) O(n), where n is the number of times the book is read

2. You need to climb the stairs in a way that for every step, you step on it the same amount of times as the total number of steps (i.e., n steps for each step in the staircase, where n is the total amount of steps). You can do this by stepping up 1 step, then stepping down a step, then stepping up 2 steps, then stepping down 2 steps, then stepping up 3 steps, then stepping down 3 steps, and so on, until you reach the top.

3. a) O(n)
b) O(n)
c) O(n)
d) O(n^2)
e) O(1)
d) O(n)
e) O(n)
f) O(log2(n))
g) O(1)
h) O(1)

4) The algorithm is O(n^2). The beginning for loop executes n times, and for each time it executes, a nested for loop executes n times also; within the nested for loop is another nested for loop that executes 9 times for each time the first nested for loop executes. Therefore, the total number of passes through the algorithm is n (the first for loop) * n (the nested for loop) * 9 (the second nested for loop). We get 9n^2, but we can ignore the 9.

5) The function f, in the worst case, performs roughly n^2 comparisons. It's for loop executes n times, and the while loop compares, on average, n/2 times for each time the for loop executes, but we don't care about the 2. It is O(n^2).

6. A sequential search, in its worst case, is O(n), and a binary search, in its worst case, is O(log2(n)). When n becomes significantly large, the binary search is much quicker.