Problem 3

1. Let c > 0 be given.

Note that for all

And since

When , which implies

This means for all , we have that for all constant c, there exists constant such that

Where f(n) = 7n+3, and g(n) = n log n

1. For the inner loop, each iteration cost

So the total runtime of the inner loop is

For the outer loop, each iteration cost

So the runtime of the code is only depends on the number we run the outer loop.

Note that initially, , after one iteration, , aftesr the second iteration, , etc.

Therefore, after k iteration,

When , the program stops. Therefore, the runtime should be