1. (0 points) What is your name? Write it clearly. Staple your HW. When is the FINAL (give Date and Time)? If you cannot make it in that day/time see me ASAP. Join the Piazza group for the course. The codename is cmsc858.

2. (100 points) Consider the following asymmetric Can Ramsey theorem:

Theorem: \( (\forall a)(\forall k_1, k_2)(\exists n) \) for all \( \text{COL} : \binom{[n]}{a} \to \omega \) there exists EITHER (a) \( I \subset [a] \) and a set \( H \) of size \( k_1 \) such that \( H \) is \( I \)-homog, or (b) a RAINBOW set of size \( k_2 \). Let \( ER_a(k_1, k_2) \) be the least such \( n \) that works.

For each of the following proofs of the \( a \)-ary Can Ramsey theorem say how you would modify it to get a proof of the asymmetric \( a \)-ary Can Ramsey theorem AND what the bound would be in terms of \( k_1 \) and \( k_2 \). It should be the case that if \( k_1 \) is small and fixed and \( k_2 \) goes to infinite you get BETTER bounds then the obv proof from Can Ramsey gives.

(a) The proof of 2-ary Can Ramsey that uses 3-ary Ramsey.

(b) The proof of 2-ary Can Ramsey by Lefman and Rodl (the one with the best bounds.)

THINK ABOUT BUT DON’T” HAND IN:

1. The proof of Mileti that used Can Ramsey and Regular Ramsey — the \( a = 3 \) case and beyond.

2. The proof of Mileti that only used Can Ramsey — the \( a = 3 \) case and beyond. (This one was your HW).